THE VIOLONCELLO: ITS HISTORY, SELECTION AND ADJUSTMENT.

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THE VIOLONCELLO:

ITS HISTORY, SELECTION AND ADJUSTMENT

BY

ARTHUR BROADLEY

WITH NUMEROUS ILLUSTRATIONS

London:
HORACE MARSHALL & SON, 125, Fleet Street, E.C.
New York:
CHARLES SCRIBNER'S SONS, 597-599, Fifth Avenue.
1921.

Printed by J. H. Lavender & Co.,
2, Duncan Terrace, London, N. 1.

PREFACE.

IN days gone by it was customary for an author to apologise for the sin of adding another book to the quantity already published.

I am sure there was a certain amount of cant in this attitude; most authors are glad to see their works in print, and, as a rule, they express the pious hope that the first edition will be sold out almost as soon as the ink is dry.

The only apology I make is that I have not been able to add any more to the scanty knowledge respecting that talented—but most elusive—maker, Carlo Bergonzi. It is close upon ten years ago since I first commenced collecting material for a work on Bergonzi, during that time the opinions given on several instruments attributed to that glorious maker have been challenged by the experts of to-day. Indeed, one of the most reliable of the many who express expert knowledge on old Italian instruments says he has yet to come across a violoncello which he can truly say is the work of Carlo Bergonzi.

So the matter has to be left still in doubt. Like the examples given to Joseph del Jesu—they will from time to time crop up only to raise discussion for a few days, then once more will come some authority and "give" the wonderful find to some lesser known Italian.

ARTHUR BROADLEY.

HENLEY'S DOWN,
CATSFIELD, SUSSEX.

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THE VIOLONCELLO:

ITS HISTORY, SELECTION AND ADJUSTMENT.

INTRODUCTION.

MUCH that is interesting has been written concerning the violoncello; its history, its music—and quite a lot on how to play it. Very little advice, however, has been given which would assist the player in choosing an instrument, not only from a tonal point of view, but so that the instrument would be an asset to him should he eventually wish to dispose of it; and scarcely anything at all has been said concerning the correct manner of its adjustment.

The aim of the present work is chiefly to assist the professional or amateur violoncellist in selecting an instrument to suit his individual requirements, In order to do full justice to the subject, it will be necessary to give a rough sketch of the gradual development of the violoncello from its infancy to its perfection in the hands of Stradivari and Carlo Bergonzi, and through its innumerable vicissitudes to the present

day. Only by such a study can the devotee of the king of instruments hope to be able to seize any bargains which may come his way, or be in the position to reject without a pang any worthless example, no matter how alluring should be its "face value."

It should be understood that the violoncello was much longer in its period of evolution than was the violin. Also fewer basses than violins were made, and at the same time viols and lutes were holding the attention of musicians and patrons. There is no wonder, then, that quite a century elapsed before we have the perfected form as given out by that genius Antonio Stradivari. It is a thousand pities that every maker after his time had not closely adhered to the wonderful perfection of model, outline, and dimensions which the "Wizard of Cremona" gave his famous masterpieces. Instead of that, we find makers who were slavishly copying the "grand pattern" Stradivari violin, constructing violoncellos either so large that one must be a giant to play them, or so small that they are of no real use for really serious work.

When submitting an instrument to a dealer, you will find the first thing he does is to take a tape-measure and test the principal dimensions; if these are not right, the instrument is doomed from the commencement, as he knows it may remain on his hands for quite a considerable time before he comes across a client who requires an undersized violoncello. Next he inspects the outline and the model, the soundholes, and that tell-tale piece of work—the scroll. All these tell him something. Then comes the varnish, the purfling, the interior workmanship, and, perhaps the last, the

label. Many dealers, however, profess to be quite superior to labels, declaring the instrument should "label itself" by the various characteristics mentioned.

How differently does the professor choose a violoncello. First and last, it is tone. He will apologize for a common looking instrument with his familiar remark, "But it has tone." Observe how he tries each string carefully in every position, tone and semitone. Looking out for the "wolf notes," the E flat on the G string, fourth position, etc. Each string for resonance and beauty of tone from the lowest to the highest positions. Then the facility with which the tone is produced in quick passages, and last, its carrying power.

They are both optimists. Whereas the dealer knows that if the wood, the varnish, the dimensions and general build of the violoncello are all right, he can pretty soon make the tone passable—even if not originally good—by correct adjustment of bridge, soundpost, bass-bar, neck, etc.; the professor knows that if the tone is all right, build, varnish and everything goes by the board.

I hope, in the ensuing chapters, to enlighten the reader on some of the methods adopted in choosing an instrument, and later, how to adjust it correctly in order to bring out its utmost tonal capacity.

CHAPTER I.

MOST writers on the origin of the violoncello commence by saying: "The violoncello was developed from the viol-da-gamba," giving the impression that the transition from viol to violoncello was direct. Personally, I think this is very far from the case. Of lutes and viols there were a great variety in the latter half of the sixteenth century; Wasielewski mentions seven different kinds of viols corresponding to the viol, violoncello and contra-bass. That there were many others is certain from the great variety of pictures which one sees depicting the instruments of this period. Although many writers would like to claim Maggini as the inventor of the violoncello—if the term inventor can be applied—it will be found, I think, that all the so-called violoncellos of this period were, in reality, chamber basses, *i.e.*, small contra-basses. Indeed, it can be claimed on very good authority that the origin of the violoncello is expressed in its name, which means "little bass."

"Double-bass" in Italian is violone. At first, the small bass was named violoncino, the Italian "ino" meaning little. Later this was altered to violoncello, the affix "ello" also having a diminutive meaning.

The abbreviation 'cello has, therefore, no meaning whatever; it is, however, very frequently used, and I doubt whether it will ever fall into disuse, much as the pedant squirms against it.

It is very interesting to observe the various forms which have been given the musical instruments of the period, by artists of the sixteenth and seventeenth centuries. Whether the instruments depicted were sketched from life, or merely artistic conceptions it is difficult at this day to state. Much can be learned, however, by a close study of paintings by the early Italian Masters; and as both music and painting were closely connected with the Church, we find that in many of the altar pieces and other church decorations the various figures are depicted playing lutes, viols, etc.; some of which give us an idea, not only how the evolution of the violoncello came about, but also how the technique of bowing and fingering gradually evolved from the earliest times to the days when more reliable records were preserved.

There is a wonderful picture in the Louvre, which I think explains, more than any other picture, the gradual development of the "violone," or contra-bass from the great bass viol. This is, to my mind, wrongly labelled "St. Cecilia playing upon a seven-stringed viola-da-gamba." A description of the picture will perhaps be interesting to those who have no opportunity of seeing the original in the Louvre, or one of the many reproductions. The picture is by Domenichino, an artist who worked in Rome and Naples 1581 to 1641, and who would therefore have every opportunity of being acquainted with the instruments of the period.

The instrument depicted is evidently a seven-stringed violone with some of the characteristics of the viola-da-gamba. The head is a carved viol head; instead of the sloping shoulders proper to the viol tribe there is distinct evidence, first, of a smaller upper bout, but without corners; second, of properly constructed lower corners and curved lower bouts, equal in shape and proportions, except at the junction of the ribs, with the modern type of violoncello. The upper and lower tables project over the ribs, and another characteristic of the violoncello is the soundholes, the upper parts of which are the usual type, the lower part being fish-tail shape. The size of the instrument, however, precludes it from being a viol-da-gamba. St. Cecilia is portrayed as resting the instrument on a low stool or bench. The violone reaches from below her knee to above her head. Judging by the attitude of her arms, the instrument depicted must be almost twice the size of the usual viola-da-gamba type, as St. Cecilia's left arm is stretched upwards in the attitude adopted by double-bass players, whilst the right arm is at its full extent in order to reach down to the level for correct bowing. There do not appear to be any frets on the fingerboard. So altogether this picture is exceedingly interesting, proving my contention that the bass was the first stage in the evolution of the violoncello. There is distinct evidence that the early players, even on the violoncello only used the lower neck positions, and it was very late in the scheme, many, many years after violin technique had reached a very advanced stage, before violoncellists found the old large and cumbersome chamber bass unsuited to their requirements.

This brings us to a point very interesting to the purchasers of old Italian or Brescian instruments. The ingenuity which has been used to transform these ancient viols and basses into violoncellos of modern type is worthy of a better cause. They have been cut and hacked about in all forms, pieces sawed off the upper and lower bouts, modelled backs substituted for flat ones; the old thin upper tables of viols thickened and strengthened, sloping shoulders cut away and upper curves nicely rounded, etc., etc.

True violoncellos were made by Maggini—although the Messrs. Hill question this, stating that in their opinion the Maggini violoncellos were evidently constructed as five-string viols—Andreas Amati, his two sons, Antonius and Hieronymus, the Ruger family, Andreas Guarnerius, David Tecchler, and many others of less repute down to the time of Nicholas Amati and Antonio Stradivari. The large-sized instruments made by these makers were held in a variety of ways, sometimes they were fitted with a strap or chain which hung round the shoulders of the player. This was adopted, evidently, to allow the instrument to be played in procession. I have evidence that many of the early instruments were fitted with a short wooden stump or peg; this was fitted, in some cases, quite out of the true, and evidently in addition to the true tail-peg. One can see traces of other methods of holding the violoncello in early days. Thus we find some violoncellos which show no signs of wear at all on the lower bouts, but which are knocked about and rubbed at the parts near the tail-pin; in one case, a fine Carlo Bergonzi, I found the back was worn quite down at

its lower edge, the round beaded edge being worn sharp. This proved that the violoncello had not been held between the knees as was customary at one time, but had been rested on a low stool or hassock.

We see signs, towards the latter half of the seventeenth century, of an attempt to improve the violoncello from its former cumbersome proportions. No doubt the players and composers of this time were awakening to the possibilities of the violoncello in chamber music, violins and violas being, at this period, almost at their perfection. It only required the correct type of bass to complete that ideal combination, the string quartet; and there is no wonder, then, that the Amatis, the Ruggeris and that incomparable genius of all time, Antonio Stradivari, set their wits to work to make the bass equal to its sister instruments.

The instruments made by Stradivari in his best period are incomparable. In outline, model, and finish it has not been possible to effect any improvement; indeed, so correct are his proportions, that should modern makers attempt to alter the outline by one quarter of an inch, other parts have to be slightly adjusted, or the perfect ensemble of beautiful form, added to rich and lovely tone, is bound to suffer. Some makers of note, like the Ruggeris and Carlo Bergonzi, had their own particular ideas of proportions in reference to tone; and those who are acquainted with the finest instruments of the latter maker have no hesitation in claiming for Bergonzi a place in the sun, equal, if not superior to Stradivari, with respect to several of his masterpieces. Those who have heard that glorious instrument in the hands of the finest artist of all time,

VIOLA DA GAMBA by
GASPARD DUIFFOPRUGCAR.

The viola-da-gamba is interesting as it serves to show the transition between the lutes and the violin. The instrument here illustrated is attributed to Duiffoprugcar but it cannot be guaranteed in all its parts. The table is evidently taken from another viol of a slightly later period. It is a seven-stringed viol and the beauty of the inlay is plainly shown in the photograph.

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VIOLA DA GAMBA by GASPARD DUIFFOPRUGCAR
with the "Plan of Paris."

Senor Pablo Casals, must admit that in violoncello construction Carlo Bergonzi had reached the utmost acme of perfection. It may not be out of place to conclude this chapter with the dimensions of the violoncello, as perfected by Stradivarius and Carlo Bergonzi.

The length of body in the Stradivari violoncellos of the best period vary from 29½ inches to 29⅞. The earlier Strads were 31 inches, and even 31⅜, but this gives a "stop" much too large for most modern players. The length which Stradivari adopted for most of the instruments made during the years 1710 to the end of his career is, I think, the most suitable, that is 29½ to 29⅞ inches.

The width of the upper bouts varies from 13 inches to 13⅝, the width of the lower bouts are 16⅛ to 17⅜.

The depth of the ribs at the lower bouts is 4⅝ to 5 inches, and at the upper bouts 4¾ to 4⅞ inches.

A Stradivari violoncello owned and played by the late Professor de Munck has the following dimensions, this instrument made in the year 1730, or thereabouts, may be taken as a good example of the smaller form of Stradivari violoncello.

By the term "smaller form" I mean in distinction to the slightly large instruments made prior to 1700. Most of these instruments were 31¼ inches to 31⅜.

Length, 29½ inches. Width, 16⅝ and 12$\frac{11}{16}$ inches. Ribs, 4¾ and 4⅝ inches.

A violoncello by Carlo Bergonzi, dated 1720, and used by Mr. Carl Fuchs, the well-known Manchester professor, has the following dimensions:—Length, 29½ inches. Width, 17⅝ and 14¼ inches. Ribs, 4¾ inches and 4⅝ inches good.

Another violoncello by Carlo Bergonzi, which I shall describe in detail later on, in reference to the fitting and adjustment, is slightly different in outline. The inner bouts are slightly less curved, and the corners a little more projecting. It has the following measurements, taken with a tape-measure over the modelling: Length, 29½ inches. Width, 17½ inches good and 14 inches. Ribs, 4¾ inches and 4⅝ inches good.

Although there is only the difference of an eighth in the width of the lower bouts, and a quarter of an inch in the upper, these variations, taken with the slightly flattened curves of the inner bouts and elongated corners make quite a striking difference in the general ensemble.

NOTE.—The exceedingly fine instrument played by Senor Casals is now attributed to Gofriller.

CHAPTER II.

IT is exceedingly difficult for the uninitiated to appreciate the glorious works left us by the Italian makers of the seventeenth and eighteenth centuries.

What is there about these old instruments of Cremona? In what way are they superior to good old French or English instruments? These questions are excusable, and they have troubled the minds—not only of amateurs—but of experts and connoisseurs; men who have spent the greater part of their lives in close association with the instruments of every school. Many people have the impression that the early Italian instruments are merely "collectors' fiddles," and have no real value from a musical point of view. This can be refuted in several ways. In the first place, the ancient lutes and viols are scarce, and of interest to the collector, yet they do not command anything like the high prices which even an ordinary violoncello by an Italian maker will command. Then again, many of the so-called second-rate Italian makers left, perhaps, but few violoncellos, in some cases, perhaps, only one or two; if rarity is the only desideratum these instruments should command higher prices than violoncellos by the elect of Cremona, the Amatis, the Guarneris, the Rugeris or Stradivari and Bergonzi, yet such is not the case.

The Italian instruments of the first class appeal in

so many different ways to those who are interested in the subject. The painter is as astonished at the rich luminous varnish of Guarneri, Stradivari, or Bergonzi as he is at the wonderful surface quality and rich colours of the masterpieces by the brothers Van Eyck, and indeed it seems as if the secret of both has been lost for ever. The draughtsman and the craftsman appreciate the wonderful outlines and modelling, the perfection and surety of tool-work. The musician glories in the human voice-like character of tone—and what is more human than the tone of a fine Stradivari or Bergonzi violoncello? The expert will often travel miles, nay hundreds of miles, merely to see and handle a well-known specimen; but more important than all, the soloist knows that with a first-class Italian violoncello in his hands he has a splendid medium for exhibiting his tone and technique. That soloists of the first rank are keen to possess a fine old Italian instrument, and will go through any privation sooner than be parted from it once it is their very own, can be proved by any who care to read the lives of eminent soloists of bygone days; and note the struggle which many of them had to secure a fine solo instrument, and the loyalty with which they clung to it, often through long years of adversity. In some cases, when an artist has grown too old for concert work, or has fallen into evil days, his violoncello has been the one article he has persistently refused to part with, and no offers—even the tempting offer of a signed blank cheque—were sufficient to tempt him to dispose of it.

There is one side of our subject which I think is exceedingly interesting. That is the manner in which

all the principal makers reproduced in their larger instruments the same characteristics of outline, model, and, more amazing still, that individual tone-character which one finds in their violins. Thus, although there is often only a very slight difference between the early work of one maker from that of his master, or between the instruments of several makers working in one atelier, yet we find as soon as a maker develops an individuality in his violins, it is also stamped indelibly on his violoncellos.

It is very disappointing that Joseph Guarnerius del Jesu did not leave us as many violoncellos as did Stradivari. There are still many experts who even now refuse to admit that Joseph del Jesu ever made a violoncello. I leave that to the experts; all the same, specimens by that maker keep "cropping up." In Carl Schroeder's "Catechism of Violoncello Playing" occurs a most amazing statement. "After Gaspard da Salo, Maggini," etc., etc., "the best violoncelli were made by Antonius Stradivarius *and his pupil Joseph Guarnerius del Jesu.*" This was written in 1889, long before the discovery of the so-called "only violoncello" made by Joseph del Jesu. That Joseph Guarnerius could never have been a pupil of Stradivari has been proved conclusively, and, indeed, one can examine any of the well-known examples of Joseph's craftsmanship without discovering a single trace of Stradivari's influence. Had we, at this day, the opportunity to compare some dozen or more undoubted "Joseph" violoncellos with the well-known instruments by Stradivari, Rugeri, and Bergonzi, our knowledge of violoncello tone would be greater than it is.

There is so much careless writing on the subject of tone in relation to various makers, that errors multiply and are repeated so often, until at last they become almost accepted facts. Thus we have the so-called "Stradivari tone." It is a well-known fact that instruments of a certain outline and model, providing the wood, varnish and thicknesses are in agreement, give out a more or less well-defined tone. So true is this, that experts can often judge pretty accurately the character of tone which an instrument of a certain build will possess. Thus we have the resonant breadth of instruments of the Maggini type; the bright, flute-like woody quality of the Amati or Rugeri; the full rich trumpet tone of Carlo Bergonzi; and of Stradivari in his best period. What can one say? Who amongst us that has heard Piatti, Haussmann, Becker, Jean Gerardy, Foldesy, Leo Stern, and several others of lesser merits, would care to say they all produced the "Stradivari tone," notwithstanding they all play or played instruments by Stradivari?

To particularize in only three of the best known cases. Piatti, with his bright, flexible, Italian singing-tone; the resonant, if somewhat hard and trombone-like tone of Haussmann; and the rich, mellow, and sonorous tone of Becker; yet the instruments used by these three great artists were made in the years 1719, 1720, and 1724; a period when Stradivari was settled in his violoncello proportions, and when, if ever, the tone of his instruments should be of one standard; if that were possible, or intended.

That the above-mentioned artists of three widely different "schools" should have been able to produce

such totally different tone-qualities from their respective instruments is a very great tribute to Stradivari; one of the greatest, I think, that could be offered to that remarkable genius, and proves that his instruments were built on sound lines, and that they have a reserve of power sufficient to allow an artist, no matter what are his technical methods, to do full justice to his individuality.

The best of the Stradivarius violoncellos are capable of producing a fine, vigorous and luscious tone, and are eminently suitable of being played under modern conditions, *i.e.*, in a large hall, and with the accompaniment of a modern orchestra. The tone produced by artists of first rank who have played the instruments of Stradivari is noted for its absolute beauty, being sympathetic and of a full, reedy, or of that "woody" quality so much desired in a fine solo instrument. In some cases—notably that of the late Signor Piatti—the tone was evidently produced with the greatest ease, passages in the highest positions being rendered with beautiful flute-like clearness. The writer has often heard it remarked that the upper notes of Piatti's violoncello were so like the tone of Joachim's "Strad" that it has been impossible, by the ear alone, to distinguish which artist was playing a particular passage.

A list of eminent artists who have played Stradivari violoncellos includes the following well-known names: Duport, Franchomme, Batta, Davidoff, Servais, De Swert, Grützmacher, Haussmann, Leo Stern, Piatti, Becker, Jean Gerardy, Foldesy, Barjansky, De Munck, and Paul Ludwig.

CHAPTER III.

I AM often asked which is the finest violoncello in this country. My answer generally is the same, "I give it up." We have, however, one of the finest specimens of the work of Antonio Stradivari, and I believe Messrs. Hill class this instrument as one of the most handsome, if not the handsomest of the Stradivari basses. I refer to that glorious instrument known as "The Cristiani." It derives its name from Mdlle. Cristiani, who was, I believe, the first "lady violoncellist" and to whom Mendelssohn dedicated his "Romance sans Paroles." For about ten years it was owned by Hugo Becker, then through the late Mr. Charles Oldham to its present owner, Mr. C. B. Lutyens.

Messrs. Hill class this violoncello for beauty of wood with the "Servais" bass. I am indebted to the owner for some of the following particulars.

This violoncello is dated 1700, but at one time a small piece of paper with the figure 8 was pasted over the final figure. It is a matter of conjecture, therefore, whether this instrument is one of the missing violoncellos, notably the "Violoncello da Venezia." It will be

THE "CRISTIANI" STRADIVARI.

The "Cristiani" violoncello is undoubtedly one of the finest and most perfect specimens of Stradivari's art. Even in the photograph the splendid beauty of its curves, the handsome wood, the artistic oneness of the whole design can be seen and appreciated. The splendour of its rich plum-red varnish can only be imagined. Note the beautiful effect given by the legitimate wear on the back.

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Photograph by F. W. Wood, London, W.]

THE "CRISTIANI" STRADIVARI.

The property of C. B. Lutyens, Esq.

noted that "The Cristiani" more nearly resembles the later violoncellos in size, being only $\frac{5}{8}$ of an inch longer than the "Piatti" violoncello, made in 1720, and exactly $\frac{5}{8}$ shorter than the "Servais" bass dated 1701. The dimensions are: Length, $30\frac{1}{2}$ inches; width, $18\frac{1}{8}$ inches; ribs, $4\frac{5}{8}$ and $4\frac{3}{4}$ inches. In appearance it is much more handsome than the "Piatti," which has a somewhat plain back. In the "Cristiani" we have ample dimensions, splendid workmanship, lovely wood which is marked by a broad curl; and the varnish, a superb coat of rich, deep plum-red.

I have had many enquiries for my opinion respecting the violoncellos by Carlo Bergonzi. Let me add at once that it is a great disappointment to me that I cannot give any further particulars of that most elusive maker than can already be read in the usual text-books; at the same time, much of the information in these same books is incorrect. Carlo Bergonzi shares with Joseph del Jesu the honour of being the most "various" of workmen. On occasions he can rise to the greatest heights, and again, one comes across roughly finished work, thick clotted varnish, or varnish sparingly applied. Many are of opinion that he influenced Stradivari in the matter of reducing the dimensions of his violoncellos, and the fact that at the end of his career Stradivari made instruments of slightly smaller build lends colour to this view. Still, it is all a matter of conjecture, and of no real moment. That Carlo Bergonzi ever made the violoncellos signed and dated by Stradivari during the closing years of that maker's life can be passed over as more than improbable. That both he, and the sons of Stradivari, may have roughed out

parts of the many instruments—especially the violoncellos—turned out by the aged Antonio, is not only feasible, but quite probable. Anyone who has attempted it knows it is quite a physical feat to cut and prepare the wood for the construction of a violoncello, a feat not beyond the powers of an old man of good physique as Stradivari certainly was, but still, it was work which could well be left to assistants.

I have, during the past ten years, traced over a dozen violoncellos attributed to Carlo Bergonzi. Most of these conform to the dimensions previously given of the "Carl Fuchs." In wood, workmanship, outline, model, and varnish they vary, sometimes very considerably. The Carl Fuchs violoncello does not seem to show the projecting corners which one associates with Bergonzi violins, nor is there that flattened waist-curve. In a word, the outline is more symmetrical than one would associate with Bergonzi. It has the original label. The back and ribs of nicely figured maple, the table of even grained pine of medium reed. The varnish a lovely cherry red over a golden amber. This describes some half-dozen violoncellos known to me, and which are attributed to Carlo Bergonzi. One or two I have seen have the early orange-coloured varnish, the brush marks, especially on the ribs, being quite distinctly seen; the corners long drawn out like the Bergonzi violins, the flattened waist-curve, the massive, masterly cut scroll, showing clever tool-work yet hasty finish, and the tone everything that could be desired. It is to these massively built violoncellos perhaps covered with only one or two coats of rich orange varnish that we must look to discover instru-

ments attributable to Carlo Bergonzi, and not to the thickly varnished, dark red instruments of Brescian or Venetian type.

Although Hart mentions that the Count Cozio da Salabue had a Carlo Bergonzi violoncello dated 1746, it was not until comparatively recent times that these instruments were sought after. The majority have had their labels removed, and these labels no doubt have been put in specimens by other makers which looked "more like." Thus many of the characteristic dark red violoncellos, labelled Bergonzi, are attributed by "those who know" to Domenico Montagnana of Venice, Pietro Ruggeri of Brescia, and that fine maker of violoncellos, Matteo Goffriller, whose star is in the ascendant.

Some of the finest violoncellos were made by the Ruggeri family. Signor Piatti for many years played one by Pietro Giacomo Rogeri, afterwards sold to and used by Miss Muriel Handley. There were at least half a dozen makers of that name. The spelling varies, Ruggeri is, perhaps, the most commonly used.

That well-known artist, Professor Whitehouse, is the fortunate owner of an exceedingly fine specimen by the best known maker of the family—Francesco Ruggeri detto il Per Cremona. The instrument is in a wonderful state of preservation; the wood of the table is magnificent; fairly wide grained pine, with the distinctive "wave" in the grain which one so often notices in instruments by Nicholas Amati. The back is "winged," that is to say, the piece of wood not being sufficiently wide to allow the necessary dimensions in the lower part of the instrument, Ruggeri, as was

common with many Italian makers, joined on two slips of wood. The late W. E. Hill said he considered the back of this instrument to be the most beautiful he had ever seen on any violoncello, the wood, varnish and workmanship being superb. The ribs are very handsome, and the scroll is a masterpiece of symmetry and nobility of design. It has the flatness of volute so characteristic of Francesco Ruggeri. The "Il Per" so often met with on the labels of this maker is somewhat of a mystery. Many explanations have been offered as to its meaning: "The Pearl of Makers," "The Father," etc., etc., it is generally thought nowadays to have been merely a nickname to which Ruggeri took a fancy, and which he added to his label to distinguish his work from that of other makers of his family.

The dimensions of this fine violoncello, which has been the solo instrument of Mr. Whitehouse for many years, are as follows: Length, 29 inches; width, 17⅝ and 14¼ inches; ribs, 4½ inches. Although the violoncello was made about the year 1689, it has been cherished with loving care, and is in a splendid state of preservation.

Space does not allow me to give detailed particulars of many fine instruments of this golden period of violoncello construction, especially those instruments which are not associated with players of any note.

A short list of the Italian instruments which have been used by famous soloists will be of interest.

NICHOLAS AMATI. Piatti played on one for some years, also the famous Julius Klengel uses one as his solo instrument.

ANDREAS GUARNERIUS. Mons. Joseph Hollmann.

PETRUS GUARNERIUS. Miss Beatrice Harrison.

RUGGERI. Mr. W. E. Whitehouse, Miss Elsa Ruegger, Mr. Herbert Withers and Mr. Herbert Walenn.

DOMENICO MONTAGNANA. Miss May Mukle, and Madam Suggia.

JANUARIUS GAGLIANO. Mr. Percy Such. A fine instrument this. A well reproduced photograph appeared in "The Strad," dated March, 1908.

GIOVANNI GRANCINO. The late Auguste Van Biene and Robert Lindley; I believe, however, the instrument used by Lindley was later attributed to Testore.

Many fine instruments were made by David Tecchler and Michael Platner, chiefly large size; and I should say these, and the instruments by Grancino and Testore are the instruments for amateurs, most of them being well constructed and of good tone, although often plain in appearance. The Grancinos and Testores seem to have used wood from the same source, as I have come across several specimens by these makers, the pine of which seemed to have been cut from the identical same tree. These violoncellos often have backs of pear tree or poplar.

CHAPTER IV.

AS no further development in the art of violoncello making has taken place since the "golden period" of Stradivari and his contemporaries, a short summary of the leading features of the French, the German, and the English Schools must suffice.

The French makers may have had more opportunities of seeing fine Italian work than had our early English makers. That some of them profited by this, is proved by the exceedingly high prices that good French instruments are now realizing. Whilst our English makers were debating the varying merits of the "Stainer" and the "Cremona," the French were diligently copying Nicholas Amati or Antonio Stradivari.

In many of the early French instruments, the varnish is not all that can be desired. So many of these makers used an outer coat of spirit varnish of a nature that did not cohere with the under coat of oil. The result is that the varnish has "frizzled," in some instances to an alarming extent.

The wood is generally well selected, in many instances the figure of the maple is not of that broad curl which one associates with the finest Italian—especially of the Venetian school, but has a fine, fairly well-defined

curl. The pine is generally well chosen, and the varnish except for the common fault previously mentioned, is good. Where the model and dimensions are right, the French instruments are only second to the Italian, and indeed in many cases are superior to the second-class Italian violoncellos.

The instruments of Boquay, Claude Boivin, Georges Chanot, Gand, Pique, and J. B. Vuillaume are all increasing in value, and if the player can "pick up" a specimen of the work of any of the foregoing makers, especially if the model and dimensions are of the "late" Strad pattern, he should make every effort to secure it.

Vuillaume and Pique made many violoncellos which, to my mind, are too large. I think these are copies of the Servais bass. The instruments of the elder Chanot are exceedingly well made. These are evidently copies of a 30-inch Strad, and examples of this maker reach well into three figures at public auction. The dimensions are of the "late" Stradivarian, the wood is beautifully selected, and the workmanship is exceptionally neat and highly finished. The varnish is generally a rich red over a golden undercoat.

The German school is cursed with the Stainer fetish, and although Jacob Stainer is said never to have made a violoncello, yet the worship of that fine maker has gone so far that a Stainer model violoncello had to be created, even if it did not exist. Thus Widhalm, the Kloz family, and since their day a host of nondescript makers, have fashioned high modelled instruments with long flowing soundholes; generally with an ugly brute of a lion's head instead of the orthodox scroll.

I am quite ready to admit that fine toned violoncellos are to be had, which are "high in the model," but if this feature is carried to excess the instruments are generally "tubby," and have not that resonant power of the flat modelled instrument.

The number of German and Bavarian instruments which possess this exaggerated, bulging, high model is quite considerable. On the Continent, the dealers and experts have a critical knowledge of these German and Bavarian instruments; and it is doubtful if many of the best specimens find their way over here. Violoncellos by the finest German makers are very much esteemed, there are so many makers of the same name, however, and so much of the work seems to be anonymous and faked that it is difficult to give any really valuable hints on this school.

The English school of violoncello making may be said to commence with Barak Norman, also a maker of viols. The violoncellos are well made, generally inlaid, the model after the style of Maggini. After Barak Norman we had quite a number of makers who, had they made all their instruments equal to their best specimens, would have made the name of the English school renowned throughout the whole world. More especially would this have been the case had they faithfully copied the instruments of Stradivari, and not allowed themselves to be "side-tracked" by inventing so-called original models, or by worshipping Nicholas Amati—at a great distance—or the everlasting Stainer.

Thus the best specimens of the work of Forster, Banks, Hill, and Lott fetch quite big money; while

VIOLONCELLO by BARAK NORMAN.

This beautiful example of one of the earliest of the English makers—Barak Norman—serves to illustrate the skill and artistry of the English school and of this maker in particular. To judge it on its own merits it stands high in the luthier's art. Our early English makers were accomplished craftsmen—to compare their work with the work of the early Italian school is like comparing the work of Hogarth with that of Raphael. Note the beautiful inlaid monogram B N on the back, under the fingerboard is also some fine inlay which cannot be seen in the photograph.

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Photograph by W. H. Horne, Leek.]

VIOLONCELLO by BARAK NORMAN.
The property of Dr. J. Mountford Johnson.

specimens by Kennedy, Wamsley, Fendt, and George Craske are often of quite superior worth. Where the instruments are of good wood, and of full size—and, as is often the case in these best specimens, the varnish happens to be superior—then you have a really fine instrument. The player should not, however, be led away merely by the name. Named or nameless, his eye and ear should be the judge. If he cannot carry the standard dimensions in his eye, he should not be afraid to take a tape-measure when purchasing, and see that he obtains at least an instrument of proper dimensions.

The size of violoncello I recommend for a player of average height and build is 29½ to 30 inches. If the player is of unusual stature, or has any peculiarity of the left hand, he must, of course, select an instrument of such proportions as are suited to his particular requirements. For instance, a player with a small, narrow left hand would never be able to play a large size Strad model, or a Vuillaume of, say, 31 inches. Personally, I must say I prefer the tone of the medium size violoncello to that of the larger size. The instruments of 31 inches and over I have heard and attempted to play, seem to partake of the deep cavernous tone of the double-bass.

The instruments of 29 to 30 inches are brighter and more flexible, whilst those of 27 to 28½ are generally too small for really serious work, especially if they happen to be "narrow," and also "shallow" in the ribs. That is to say, if the width across the instrument and the depth of the ribs do not come up to full dimensions, it is impossible to have the tone.

CHAPTER V.

MANY modern makers, both professional and amateur, have the idea that if they could only arrive at the correct dimensions, thicknesses, and weights which Stradivari was accustomed to employ in the making of his violoncellos, the tone of their instruments would be equal to that of the Stradivari violoncellos. That this is a fallacy has been proved times innumerable in the art of violin making, and I think we might take it for granted that the same will apply in the case of violoncello making.

In the endeavour to restore the lost art of violin and violoncello making, the changes have been rung on every phase of what may be termed the science (in contra-distinction to the art) of violin making. The making of violins and violoncellos is fundamentally a craft; it was raised to an art by the finest of the Italian luthiers. It degenerated into a manufacture with the Markneukirchen and Mirecourt makers, from which slough of commercialism our finest British makers have endeavoured to raise it to a science.

Let us see what scientific investigation and experiment has done for the art of violin-making. I say violin-making advisedly, as I find that most experimenters have taken the smaller instrument in preference

to the viola or violoncello. Science has told us that the wood must be of certain kinds. The tree selected must be of a certain size, and it must be grown on the south side of the forest; the only part of the tree to be used must be that on the south side, and not too near the root, or too near the branches. The wood must be cut in the months of December and January. All this, of course, is only to insist that the wood must be properly matured during growth by a full exposure to the sun, that it must be free from sap when cut, and that the grain shall be nice and even without knots. Science has even gone beyond this, and tells us that the plate of wood must be of a certain density, and other matters which will be referred to in due course.

The numerous experiments tried in order to arrive at maturity by artificial means are not worthy of consideration at this day, but in times gone by great store was set on the wood being "prepared." Enthusiasts baked the wood, steamed it, pickled it, treated it with acids, caustics, spirits, and what not too numerous to mention. Even a great maker like Vuillaume "treated" the wood of quite a number of his instruments, thereby hoping to acquire by artificial means what could only come by age and use.

The next fetish was the tone of the air-mass and the tone of the plates. To this day there are quite a number of makers constructing very fine instruments, the success they achieve they themselves attribute to the "toning" of the plates. It can be proved, however, that equal results have been arrived at by makers who have had not the slightest knowledge of this subject, and, more curious still, by makers who,

from a wrong conception of the experiments carried out by the pioneers of this system, have made a hash of the whole thing by reversing the system of "toning."

I can imagine my professional reader saying, "Well, what about the varnish?" To my mind the varnish is one of the most important matters. Varnish will never *make* a fiddle, but it has *spoiled* thousands.

The varnish of Cremona is a lost secret. It has been discovered hundreds of times, not only the actual formula, but something superior, I suppose! At any rate, chemists and drysalters, to leave out of account the ordinary man in the street, have spent various sums, up to thousands of pounds, in experimenting on varnish making. How even a hundred pounds could be spent is always a mystery to me, seeing that all the ordinary varnishes made with amber, copal, gum-lac, gum-mastic, sandarac, elemi, Venice turpentine, and a host of gums and resins, hard and soft, are well known, not only to the trade, but the formulæ of any or all of these can be found in many books and pamphlets.

The amber and linseed oil theory has brought ruin to thousands of instruments. Personally, I am of opinion that the Cremona varnish was a very simple affair. The gum or resin used was of very little account. It may have been copal, what was of account, however, was the vehicle, and we must look to the lighter oils, and not to linseed oil. It is necessary to use an oil which does not oxidize so much as linseed oil. I would direct attention to poppy oil, and oil of spike lavender. Now the next matter of importance is the manner of preparation.

The gum should be melted separately in oil of spike lavender or turpentine. The oil should be allowed to stand exposed to the sun and air until it is of the consistency of honey, then it should be thinned with oil of spike lavender. Last, we have the colour. Whatever colour is used should be separately mixed with oil; it should then stand until the particles which do not dissolve settle to the bottom of the bottle or flask. The clear coloured oil should then be decanted, and allowed to stand until thick. Now all this seems very vague and haphazard, and it is this very absence of hard and fast rules which gives us the varying artistic appearance of the Italian varnish. Stradivari, with his usual care and methodical manner, could be relied on to mix the ingredients together in proper quantities, and of proper consistency. Joseph Guarnerius and Carlo Bergonzi, both clever and at the same time careless workmen, very frequently allowed the coloured oil to be so thick that it would not mix properly when applied: that accounts for the clots. It is interesting to note that the clots appear more often in the dark varnish, showing that the coloured oil had been allowed to stand too long before being incorporated with the varnish.

If the varnish of an Italian instrument of the Stradivari period is examined under a microscope, it will be found that it is composed of two distinct substances, a clear oil, and a lot of minute resinous particles. The same appearance is noticed in varnish prepared as I advise, and if the varnisher is sufficiently careless he can produce "clots" in abundance.

The beautiful warm, dry climate which is general

in Italy is conducive to a quicker drying of this oil than would be possible here. Even then it was necessary to allow the oils and varnish to partly oxidize by inspissation (that is, by allowing the more volatile portions of the oil to evaporate) so that drying was encouraged.

How many attempts to reproduce the old Cremona varnish look quite all right when the varnish is first applied, but after the lapse of a few years the resin and oils oxidize to such an extent that the whole effect looks dry and resinous, and utterly lifeless.

I have proved that a varnish composed as I advise is suitable for violin and violoncello varnishing. It is clear, full of life, does not oxidize in nearly twenty years to any appreciable extent; and the effect on the tone is to keep it bright and flexible. That this varnish remains pure after many years' exposure to light and air can be proved by taking a look at many of the pictures which were painted during the Victorian era. Many of the finest artists used a mixture of copal varnish and poppy oil, thinned down after inspissation with oil of spike. The pictures painted with this medium are as bright and pure in colour to-day as when executed fifty or more years ago.

CHAPTER VI.

IF it happens—as in all the arts—that various matters in the construction of the violoncello are not bound by fixed rules, but are left to the individuality of the artist, there are certain matters which will allow of no such individual expression, but must of necessity follow more or less a fixed plan.

Of these, what are termed the "fittings" of the violoncello are more or less standardized by use and custom to such an extent that to hear the expression, "The instrument is beautifully fitted up" is to declare in other words that the recognized standard of the fitting and adjustment of the instrument has reached well-nigh perfection.

In a well-constructed violoncello of standard size, the neck, fingerboard, bridge, tailpiece, pegs, and sliding pin must be given the form and dimensions which custom—derived from the practice of the best luthiers, in conjunction with the requirements of the finest artists—has declared to be the acme of perfection.

Of the various patents, and so-called improvements which from time to time have been made in the shape of the bridge, the tailpiece, and various other fittings and accessories of the violoncello, there are none which are essential to the emission of the best tone which a "fine" instrument is capable of giving.

Without specifying any of the well-known patents, many of which have helped a host of "lame dogs" over the particular "stiles" of their afflictions, it is sufficient to again affirm that if a violoncello is properly constructed, it only requires the fittings to be of the standard pattern, and the adjustment to be delicately carried out. It will be noted that the fittings on some of the finest violoncellos, played by the greatest artists, are of the plainest description—beautifully and delicately made—but all freak accessories are strictly tabooed.

The neck, or graft as it is called in the trade, should be of nicely figured maple or sycamore. If possible, it ought to match in figure the back and ribs of the instrument. It is absurd to fit a neck of broad figured maple to the instrument which has a back and ribs of finely marked, close-grained wood. At the same time, if the back of a violoncello is very plain, a neck of nicely marked wood, instead of accentuating the plain character of the back, seems to relieve it—but it must not be overdone.

The fingerboard should be of the most approved pattern; that is, with the portion under the C string nicely scooped away. If the player insists on having the strings fitted very close to the fingerboard, it is an advantage to have what is termed a "hollow board." This also must not be overdone, or the advantage gained in the highest positions will be lost in the middle register. Only the slightest hollowing, exactly midway between bridge and nut should be given; it should not be evident to the eye until a rule, or straight-edge is laid close to the face of the board;

VIOLONCELLO by FRANCESCO RUGIERIUS.

This instrument by Francesco Rugierius is the solo instrument of W. E. Whitehouse, Professor R.A.M. and Violoncellist of the London Trio. The beautiful appearance and fine tone of this instrument is well-known to London concert-goers. Note the "winged" back. This device was often used by early Italian makers when they wished to use a piece of wood of exceptional tonal properties but which was not large enough for the purpose in hand. The instrument is covered with a rich warm-red varnish, most clear and translucent. (See page 19).

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Photograph by F. W. Wood, London, W.]

VIOLONCELLO by FRANCESCO RUGIERIUS, II Per.
The property of W. E. Whitehouse, Esq.

then it should be noted that there is a very gradual hollowing-out of the fingerboard, at its deepest place only very slight, and insensibly fading away to nothing as it approaches each end.

The under part of the board should be scooped out; if this is not done, the weight of this thick piece of ebony, as bought in the rough state, is far too great, and would impede the vibrations.

The thickness of the board should be nicely adjusted, and in conjunction with the neck should form a pleasant and convenient grip for the left hand. That is to say, if the neck with the addition of the fingerboard is too thin, the player will not be able to attain that nicety of attitude of the left hand. He will also be more liable to cramp in the fingers, if the neck is very much on the thin side. If on the other hand the neck is too thick, the same will apply in the opposite direction. A thick, clumsy neck is an abomination.

To many players the pegs are a source of annoyance. This should not be the case if rosewood or ebony pegs are used, and they are beautifully adjusted. Personally, I prefer those of rosewood. I find that ebony pegs are more inclined to split if the peg gets stuck in the peg-box and extra force is used to turn it. In a well-regulated instrument, however, this catastrophe should never happen.

In order to have pegs which will work smoothly, it is essential in the first place to see that the peg-holes are properly bored in the peg-box. That they are in such a position that the D and G strings do not rub against the C and A pegs. Sufficient clearance must be allowed. It is also necessary that the holes are

bored with the necessary taper, and perfectly true; if these matters are correct, it should be an easy matter to fit the pegs so that tuning is not only easy, but an absolute pleasure.

Many old instruments have the peg-holes worn to such an extent that the pegs can be pushed through almost to their heads. Where this is the case, the remedy usually employed is to "bush" the holes—that is, to fill up the old peg-holes and re-bore them.

In cases where it is not advisable to re-bore the holes, or as a temporary expedient, there are several forms of self-gripping pegs which may be fitted with advantage. That abomination, the "machine-head," as used on the double-bass, should in no case be fitted to the violoncello. I have seen many scrolls damaged beyond repair by this contraption. The class of self-gripping peg to which I refer does not disfigure the cheeks of the peg-box in any way, but merely grips the sides with any pressure which may be desired.

We will presume, however, that the scroll and peg-box of the instrument is in perfect condition. That a nice set of rosewood pegs has been selected, and beautifully fitted; the only matter remaining now, is to bore the small holes through the pegs themselves, through which to pass the strings. These holes should be bored at a sufficient distance from the side of the box to allow of two or three turns of the string. By arranging the string on the peg in this manner it can be caused to push in the peg the tighter the string is drawn. In putting on a new string the player should always adjust the string in this manner; that is sufficient string—and only just sufficient—should be allowed,

so that when the string is tuned to pitch, the last lap slightly wedges itself against the side of the box. If too much string is wound round the peg, the danger will be that the peg may be forced in too tightly.

The next matter of importance is the bridge. The pattern of the bridge most in favour is that known as the "Aubert." Here, again, if the violoncello is properly constructed, the regulation pattern bridge will suffice. The width of the bridge is determined, however, by the distance between the upper portions of the soundholes. It would seem that this elementary matter would be apparent to the merest tyro. Such is not the case however, and I have come across many instances where a wide bridge has been fitted to a narrow-waisted violoncello, the feet of the bridge coming in line with the upper circles of the soundholes.

If the width of the bridge is governed by the width of the instrument at the waist, and the distance between the soundholes, its height should *not* be governed by the set of the neck.

Each violoncello requires a bridge of a certain height in order that it shall give out the best tone of which it is capable. The set of the neck should be arranged to the height of the bridge; in most cases the opposite method has been chosen.

As a rule, a narrow, high bridge gives a brilliant tone, but this also is influenced by the model of the instrument.

A matter of the greatest importance is that the bridge be beautifully fitted, both in relation to the upper table of the instrument, and also with reference to the distance of the strings from the fingerboard.

CHAPTER VII.

WE now arrive at a more detailed description of the "fittings" of the violoncello.

The measurements given are taken from an old Italian violoncello attributed to Carlo Bergonzi. The instrument is beautifully fitted up for solo playing, and is of full size, *i.e.*, 29½ inches length of body. The dimensions of the various fittings given herewith will therefore apply to any violoncello of similar size and build; it must be understood, however, that each instrument requires some little variation of position and dimensions of bridge, bass-bar, and soundpost to suit its individual constitution.

Only a thoroughly capable workman, and one who has had the advantage of seeing and testing a number of fine instruments, should be entrusted with the delicate operation of adjusting a valuable old violoncello.

The Fingerboard

is 23⅜ inches in length, 1¼ inches wide at the nut, and 2½ inches at its widest part. The under part is scooped out to a distance of 9 inches, and this, with the beautiful bevel which is given every portion—except the end which fits flush against the nut, and the part which

is glued to the graft—gives an apparent thickness of a quarter of an inch throughout.

The matter of the thickness is of the greatest importance, and affects the tone very considerably. Many experts even go so far as to assert that the quality of wood employed in the graft—that is, the neck—and in the fingerboard, influences the vibrations to a very considerable extent.

In the olden days the tendency was to fit a short, heavy fingerboard; the reverse is the case in these days, especially as far as length is concerned, and one often comes across a violoncello on which the board is so long that very little space is left between the end of the board and the bridge.

With a 27⅜ vibrating string—that is the length of string between nut and bridge—a 23⅜ fingerboard allows 4 inches clear between the end of the board and the bridge. The height above the table at the extreme end of the board is 2½ inches, including the thickness of the board at the centre.

The board should be of fine grained ebony. Rosewood, or plain hard wood stained or veneered, is never countenanced in these days, nor is any ornamentation allowed.

The Tailpiece,

a fitting of the greatest importance, is 9 inches long; it is fastened by a loop of gut. Formerly a piece of double-bass first string was used, and in some cases, a loop of brass or copper wire; it is possible now to get a specially prepared gut nicely dyed red, black, or mauve; the latter looks very artistic; of more importance, however, is the method of fastening the tail-

gut, and the length of the same. To take the latter item first. If the tail-gut is too long, the tailpiece will be pulled up too near the bridge, more or less muting the tone.

As a proof of this, it is only necessary to fix a small wedge or weight behind the bridge, to see the muting effect.

The clearance behind the bridge should be quite 5 inches; in the 'cello under notice, a clearance of 5¼ inches is allowed.

The cheaper kind of tailpiece has two holes bored right through; the tail-gut is passed through these holes, the two ends being twisted under the end-pin. This is a very insecure and unsightly method of fixing. The correct form of tailpiece has a "hollow" scooped out, about an inch from its narrow end. The two holes to receive the gut are bored longitudinally in the end of the tailpiece, and emerge at this hollow. The tail-gut is cut a proper length, the loop passing under the end-pin and the two ends being passed through the holes. These ends are now singed until a small protuberance forms, a piece of waxed linen thread, or a thin piece of violin E string is tightly lapped round and tied—this to prevent the "cinder" being pulled through the hole in the tailpiece, and the fixing is invisible.

Care must be taken that the ends of the gut are not scorched to such an extent that an absolute "cinder" forms, or it will be bound to break off. The scorching must only cause the gut to expand, and partly untwist; this is prevented from going any further by the linen thread, or thin gut.

The End-Pin.

Great improvements have been made in this mechanical fitting of the violoncello, and although it has not such an effect on the tone of the instrument as have some of the other accessories, it does materially affect the comfort of the player to such an extent that unless an instrument is fitted with an end-pin of suitable design, and of sufficient length of sliding-pin, the player cannot get the best out of his instrument.

The finest quality pin, and the pattern most widely adopted by players of first rank, is the "ratchet." Inside the hollow plug, which fits in the lower block of the 'cello, is a spring clip. This clip has a small bead-like projection which fits into the numerous notches in the steel pin. A thumb-screw allows the sliding-pin to be adjusted at any requisite length. It should be possible to have a pin fitted which gives an extension of quite 12 inches.

And now to one or two debatable points. Several of the old players—I might instance Signor Piatti and Herr Haussmann—did not favour the use of an end-pin at all, but preferred to keep up the old-fashioned method of holding the 'cello merely by gripping it with the knees. I can quite understand that in the case of Piatti he would have a difficulty in becoming accustomed to a sliding-pin; I have been told that when trying a strange instrument which was fitted with a sliding-pin, he quietly pushed in the pin, and held the violoncello in his accustomed manner.

Some players—I believe Herr Becker is one—affirm that a wooden end-pin is preferable, that it carries the vibrations to the floor. That artist also uses a

sounding-box to further assist in augmenting the tone. Personally I do not think there is anything in it. So long as the ribs of the violoncello are left free, it is of little consequence whether the end-pin is of wood or metal, or, as in the case of Haussmann—who certainly had the biggest tone of any artist I have ever heard—it is dispensed with entirely.

I do not wish it to be understood that I favour the system of holding the violoncello without the aid of a sliding-pin; but rather on the contrary, I advocate the use of the very latest and best that can be obtained, in order that the player can adopt an attitude which is at once comfortable and artistic.

It may be superfluous to add that the end-pin must be nicely fitted; the hole in the block must be bored so that the pin, when extended, is in perfect line with the axis of the instrument. In other words, the pin must not have a tendency to slope either forwards or backwards; only by being in perfect line with the instrument can ease of attitude be attained.

The Pegs.

In the instrument under notice I find the peg-holes are bored in the following manner. The two upper peg-holes are from centre to centre exactly one inch apart. The two lower are also bored at the same distance apart. The space between the two pairs of pegs is exactly 1¼ inches, measuring from centre to centre. This gives the following—from centre to centre D to G one inch; G to A one and a quarter inches; A to C one inch.

The shafts of the pegs should be cut off; their tips

projecting almost level with the face of the peg-box, then nicely bevelled. On passing the finger over the face of the peg-box, only the slightest indication of the end of the peg is discernible.

The shaft nearest the thumb-piece projects exactly one inch; all the pegs are fitted evenly, and including the thumb-piece, project exactly 2¼ inches. This may seem a trivial matter, it is of importance however, as when fitted with this amount of projection, a good and comfortable grip is obtainable.

As before mentioned, the pegs should be of plain rosewood, not carved or ornamented in any way. Sometimes a small inlay of gold is inserted in the end of the thumb-piece, but it is of no consequence, except that it has a habit of coming out, when the vacant place looks unsightly.

The Nut.

A piece of ebony fitted at the upper end of the finger-board, over which the strings pass. It is essential that it shall be nicely and smoothly made, and be given a perfect fit.

Its length is the width of the scroll, and it is nicely bevelled in all ways, except that part which fits flush against the end of the board. The niches or grooves over which pass the strings are cut so that the finger-board projects one-eighth of an inch at each side. This is important, if sufficient projection is not given, the fingers are apt to slip off the strings; this applies especially to the A string.

The grooves are spaced as follows. The distance between the C and G strings, from centre to centre, is five-sixteenths of an inch; between the G and D,

one quarter of an inch, and the same between the D and A strings. I find these distances the most suitable for all kinds of technique, both single and double-stopping.

The strings are only half embedded in the grooves, which are graduated according to the thickness of each string, and each groove is smoothly finished so that the string passes easily and without friction. The distance of the string from the board is scarcely a measurement, but I find that a thick postcard passes easily under the string quite up to the nut.

The Saddle, or Rest.

This is a piece of ebony inserted to take the pressure of the tail-gut, and to raise the tailpiece clear of the table. It should be inserted in the table as far as the line of purfling, and is $2\frac{1}{4}$ inches by $\frac{3}{8}$ thick. The tail-gut should be quite flexible over this saddle—that is to say that when the strings are loosened, the end of the tailpiece should not be in contact with the saddle. The disadvantage of allowing the tailpiece to project too far over the saddle, and thus weighting the bridge has been previously mentioned.

CHAPTER VIII.

THE three most important features of the violoncello are the bridge, the bass-bar, and the soundpost.

Writers on the subject love to ascribe to these three features various physiological and psychological attributes; if such terms can be applied to an instrument.

Thus, collectively, they have been termed the "nervous system" of the instrument, whilst the soundpost is poetically named by the French, "the soul."

Scientific investigators have spent much time in trying to fix the laws which govern the action of the bridge, and their relation to bass-bar, soundpost, and the upper-table; in many cases, however, their premises were arrived at after the study of only one portion of the subject. In these cases the conclusions arrived at are not sound, and much that was considered truth a decade ago is now proved to be fallacy.

In order to establish a correct theory of the functions of the bridge, it is essential that the subject should be studied in conjunction with soundpost and bass-bar; and the exact relation of the whole to the plates of the instrument.

I would like to point out that in order to judge whether an instrument is properly fitted with these

three important accessories—if they may be so termed —it is essential that the following facts are kept in mind.

Active and Passive Vibrations.

The vibrations of a stringed instrument are of two kinds: active and passive.

To state the matter broadly, the vibrations of the bridge and the sound-box—including the bass-bar and the soundpost, are chiefly active. The vibrations of the neck, fingerboard, tailpiece, sliding-pin, scroll, and pegs are chiefly passive.

In cases where parts which should vibrate passively only, become aggressive and vibrate actively, we have peculiar sounds, thus a loose fingerboard, or even a cracked peg, will give out most unpleasant noises.

In some instances, instead of active vibrations in some of the parts, we only get passive vibrations, or perhaps no vibration at all. In these cases we get false tones, wolf notes, etc.

Bearing all this in mind, we now arrive at

The Bridge.

It may be said with some truth that each violoncello requires its own style of bridge; and the following matters should be taken into consideration.

The weight of the bridge; this is governed by the size and thickness, and the density of the wood.

The pressure it exerts on the upper table; governed chiefly by its height in relation to the set of the neck, and also by its distance from the tailpiece.

The width of the feet of the bridge, and their distance apart, is also of the greatest importance.

Would-be improvers of stringed instruments thought that by taking the pressure off the bridge, and thus relieving the weight on the upper table, the tone would be improved. In practice this does not happen. It has been proved that the bridge communicates its vibrations, only when a certain amount of pressure accompanies its vibrating action.

Working along the same lines, others thought that by cutting away the feet of the bridge to the smallest possible dimensions, the table would be able to vibrate more freely. It is found, however, that a certain amount of contact is necessary, enough but not so much that the vibrations of the belly are impeded.

Working on entirely opposite lines, some have thought that a bridge which gave the greatest surface contact with the belly was the desideratum, and thus we get the bridge without feet; *i.e.*, a bridge which presses on the soundboard with the whole width of its surface.

On the assumption that the vibrations from each string were carried separately down the feet of the bridge, we were given the three-footed, and the four-footed bridge. These improvements have been worked out on the assumption that the inner strings could more readily transmit their vibrations to the belly, if brought into more immediate contact with the feet of the bridge.

It must be remembered, however, that too much surface contact tends to muffle the vibrations, and also that the bridge vibrates as a whole, and the sound is conducted simultaneously by both feet to the table.

Much can be done to improve an instrument by

selecting a bridge of open soft-grained wood—if the tone is hard and metallic. In this case the soundpost should be moved a little further away from the bridge.

If the tone is too soft and loose, a narrow, high, close-grained bridge should be selected. This idea of effecting improvements in tone by means of the bridge must not be carried too far however. It is very easy for the ear to become accustomed to a faulty tone-quality, and thus be insensible to the disagreeable metallic sound which a thin, close-grained bridge will impart to some violoncellos.

In carrying out these experiments, after selecting a bridge which is likely to suit the constitution of the instrument, allow it to remain on the violoncello at least a month. In the meantime, try a slightly different position of soundpost; thus, if the tone of the A is aggressive and the remaining strings dull, move the post a little nearer the D string. If the instrument requires brightening up generally, move the post slightly nearer the bridge, and in conjunction with a slightly higher bridge, the tone should be very much improved.

Other suggestions relating to the various methods of improving the tone by varying the position of bridge and soundpost will be given later.

The position of the bridge is generally central, that is, exactly in the centre of the two soundholes, and equi-distant from both. The notches in the soundholes cannot always be taken as a guide, very often they are wrongly placed, high or low.

The left foot of the bridge should be exactly over the bass-bar, and, as a rule, a line drawn from both

feet longitudinally should pass on the inner sides of the upper circles of the soundholes. That is to say, that the vibrations communicated by the feet of the bridge should be able to travel the whole length of the belly, and should not be interrupted by the soundholes intervening.

CHAPTER IX.

A WELL-FITTED BRIDGE is not only absolutely essential for the proper production of tone, it is also necessary in order that the upper table is not damaged. How often does one find that the tables of old instruments are almost ruined by deep ruts caused by ill-fitting bridges.

It may astound the general reader to learn that not many people have a really keen ear for the discrimination of tone-quality. It is this lack of knowledge which is a danger to any who try experiments with bridge and soundpost.

Even if the amateur has a keen ear for tone-value—the ear soon becomes weary, and loses its power of judging the minute difference of tone with the bridge and soundpost in varying positions.

One of the greatest tests to give those who are inflicted with the bridge and soundpost craze—for, in spite of its importance, it does become a craze with some

amateurs—is to advise that the instrument be put away for a fortnight. In the meantime, another instrument should be constantly played upon. At the end of the fortnight, take out the old instrument, and note keenly the main characteristics of its tone.

This is also an admirable plan to follow if a player becomes temporarily disgusted with his instrument. Play on another for a little time; give the ear a complete change, then you will be in a better state to judge the tone quality on again taking up the instrument.

In this chapter I give a sketch of the bridge. This is taken from a genuine Aubert bridge, and gives the main features of bridge-fitting. The outside lines are traced from the bridge in its rough state. The inner lines are from the bridge when cut to fit the violoncello.

A most important matter is to see that the wood which is cut away does not interfere with the symmetrical design of the bridge. Thus it would have been possible to have fitted the bridge by only cutting wood away from the feet, leaving the wood in the upper part almost intact. A little consideration, however, will prove that had this been done, the bridge when fitted would have been top-heavy. The feet would have been short, bringing the arch of the bridge too near the upper-table.

In some cases it might happen that it would be advisable to fit the bridge in this manner, in order to leave an extra amount of wood in the upper portion of the bridge, but I think it will be acknowledged that if the surplus wood is cut away in the proportion as given in sketch, the effect is satisfactory.

The sketch does not show the beautiful manner in which the outside curves are bevelled. This seems to have been done with one clean cut of the knife, and gives the impression that the bridge was made

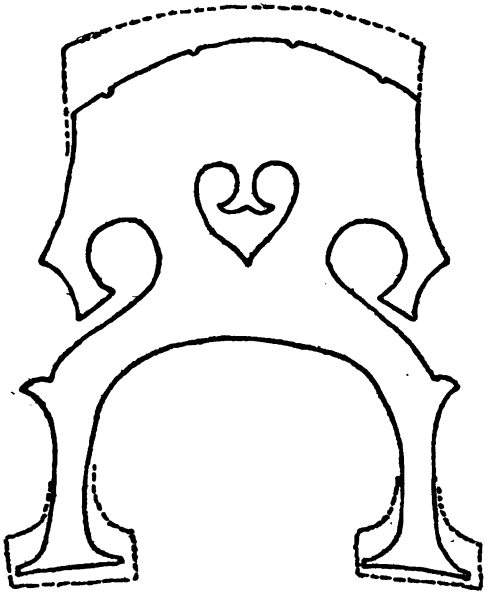


DIAGRAM I.

of some soft substance through which the knife went easily and sweetly. This clean cutting reveals the handiwork of the skilled craftsman, and is a joy to behold.

The bevel is only given to the outside curves, and to the arch. The inner waist curves and the heart are left untouched, the edges being quite sharp.

The curve of the top of the bridge must be noticed. This follows the curve of the fingerboard, and as the board is of the Romberg pattern, *i.e.*, cut away under the lower strings, the symmetrical shape of the bridge is preserved. This is quite unlike the old-fashioned bridges which of necessity used to be fitted high on the bass side, and very much cut away—often far too much so—on the treble side.

Another matter of great importance is the thickness of the bridge. This may be roughly given as half-an-inch at the feet, tapering to one-eighth of an inch at the top. It may be stated that the top of the bridge is nicely rounded or bevelled off, so that it really looks slightly thinner than one-eighth.

Some makers taper the bridge from one side only, that is to say, the back of the bridge is fitted quite perpendicular, whilst the front—that part nearest the fingerboard—tapers or slopes towards the back. Others taper the bridge evenly on both sides, and fit the bridge so that it stands quite perpendicular.

The former way seems good, *i.e.*, the bridge itself tapers backwards, whilst the fitting is perpendicular. Some makers, on the other hand, give the bridge a pronounced backward slope, trying in this manner to overcome the tendency of the bridge to pull forward.

The niches or grooves which are cut for the strings to pass over should first be marked out with a small corner file, then with fine glass-paper wrapped around a suitable tool, nicely rounded and made perfectly

smooth. Beware of cutting them too deep at first. The correct depth is barely half the thickness of the string. It will be found however that the pressure of the string gradually cuts into the bridge ; this is more apparent if the bridge is worked a little on the thin side at the top. The chief matter is to have the grooves shallow, and round; not wedge shape, or the strings are inclined to stick during the process of tuning.

Observe the feet of the bridge. They fit the curve of the upper table so that no separate line of juncture can be seen. It is surprising how the tone of an instrument is affected by the bridge. So much is this the case that I have known soloists who were at great pains to try and duplicate a particularly fine bridge, in terror that if anything happened to the one which was fitted to the instrument the tone would be more or less ruined.

It is advisable, when a new bridge is fitted, and it is found that the tone is all that can be desired, to secure at once a bridge cut from the same piece of wood. This bridge should be cut to shape and kept in readiness in case of accident.

Personally, I am of opinion that in this matter the larger instruments, like the violoncello and contrabass, are more acutely affected by a change of bridge than are the smaller instruments.

This opinion I have formed after hearing violinists play in public within an hour of having a new bridge fitted. I always insist that a violoncello does not recover its tone for at least a week after having a new bridge fitted. It seems to take longer for the larger instruments to settle down after the operation.

CHAPTER X.

ALTHOUGH the sound-bar of the violoncello is usually termed the bass-bar, I discovered more than twenty years ago that the term is a misnomer.

In a letter to "The Strad," which was published in the issue of October, 1900, I wrote to the effect that I had proved by experiment that the old idea of the vibrations of the bass-strings proceeding down the left foot of the bridge, and thence to the bass-bar, was a fallacy. This discovery was made in a peculiar way, and is worth repeating.

First it will be as well to state what, up to that time, were the usually accepted functions of bass-bar, bridge, and soundpost.

The most widely accepted idea was that the bridge acting as a reed, like the mouthpiece of the oboe, transmitted the vibrations to the column of air inside the instrument. So far, the analogy might be said to be very good; it was in the elaboration of the method of this transmission that writers came to grief.

Thus:—"The vibrations of the bass strings are carried down the left foot of the bridge to the bass-bar, and those of the treble strings down the right foot of the bridge to the soundpost."

Again :—" The function of the bass-bar is to restore to the belly the wood which is taken out in cutting the soundholes."

Others, getting more advanced, and working on scientific lines, say :—" The bass-bar raises the plate note and thus neutralises the effect of the pressure of the bridge."

Or :—" The functions of the bass-bar are to transmit to the entire belly the vibrations communicated to it by the left foot of the bridge, and to prevent it from entering into a series of segmental vibrations, and not, as has so often been laid down, to strengthen the belly."

Other authorities pass over this part of the internal mechanism with only broad generalities, thus Hills say :—" Broadly speaking, its function consists in retarding the vibrations of the one side of the belly, thus materially helping to obtain the graver bass notes."

Hart, in the 1909 edition of his famous book, says : —" The bar of the violin not only serves the purpose of strengthening the instrument in that part where the pressure of the bridge is greatest, but forms a portion of the structure at once curious and deeply interesting. . . . Numerous attempts have been made to reduce these features to a philosophy, but the realisation of the coveted discovery appears as distant as ever."

To return to the commencement of my own researches on the subject. A friend of mine, who was what is commonly termed left-handed, commenced playing the violoncello. He consulted a violin maker, who advised that he should have bass-bar and soundpost reversed ; as this seemed sensible, he had it done. A

few years later he wished to dispose of the instrument, and not wishing to incur the expense of having the bar again moved back to its original position, if not absolutely necessary, he merely reversed the strings when, to his amazement, he found that the tone was quite as good, or, as he stated, "better, if anything." This violoncello passed into the hands of a well-known professional who played it for some time before he discovered that the bar and soundpost were in reversed positions.

This incident, which I quoted in some correspondence to "The Strad" of twenty years ago, gave me the germ of an idea, which I daresay is now more or less common property.

I discovered that the vibrations of a stringed instrument were of two kinds, as I have previously stated (see page 44) *i.e.*, active and passive. When a full chord or arpeggio is played on all the four strings, practically the whole of the instrument vibrates actively. When the highest notes of the A string are played, only a small part of the belly vibrates actively, the adjacent parts vibrating passively.

If the bass-bar is of sufficient size and weight, and properly placed, the active and passive vibrations of the belly are so controlled that every note tells out clear and firm. If this important piece of mechanism is not properly constructed, the parts of the instrument which should produce the tone by active vibration only vibrate passively, or perhaps do not vibrate at all, we then get "wolf notes," and false or weak tones.

This does not dispose of many theories which may be

scientifically correct, such as plate-notes, bridge pressure, etc., etc.; but it does account, as I have proved by numerous experiments, for the mechanical action of bar and bridge.

Although the upper table may be strong enough—as some writers state—to bear the pressure of the bridge, even without the bar; it will be found that the tone is weak and hollow, and, in some parts of the register, no "body" of tone is able to be produced. Experiments have been made in order to see if it were not possible to do away with the sound-bar; for instance, the wood in the left half of the belly has been left of a sufficient thickness to compensate for the absence of the bar; the result was very detrimental to the tone.

It is thought that the ancients did not at first glue in a separate bar, but merely left the wood in a thick ridge at this part of the bridge. Indeed, I have had instruments of the commoner Brescian type which had the upper table so carved.

The usual plan is to glue the bar in a slightly oblique position, more or less following the line of the bass-string. This is in order that the fibres or grain of the belly over a certain area will be controlled by the vibration of the sound-bar, and not, as is so often supposed, that the bar follows the line of the bass string, so that it will vibrate in sympathy with it.

The generally accepted rules are:—"A weak bar gives a hollow, unsubstantial tone to the lower strings. A bar which is too heavy causes the tone to be hard to produce, a short bar often gives "wolf" notes, and a bar which is too long, or which is set too oblique, impedes the vibrations.

It will be seen then that it requires great experience to judge to a nicety the exact size, weight, and position of this most important part of the violoncello. Many modern makers err in making the bar too substantial. The result is that the tone of so many modern instruments is dull, woody and heavy. This seems to apply more frequently to the violoncello than the smaller instruments, the dimensions of which are more standardized and thus better understood and regulated.

The character of the instrument, the density of the pine of the upper table, and many other matters have to be taken into account when fixing the dimensions and position of the sound-bar; however, the following dimensions taken from an old Italian instrument, of standard size, although of slight build, will be of interest. Length of bar, 24 inches; greatest depth, $\frac{7}{8}$ths; width at each end, $\frac{1}{2}$ inch; width in centre, $\frac{3}{4}$ inch; distance from centre joint, upper end, $\frac{7}{8}$ths; lower end, $\frac{9}{8}$ths. The bar is "set in" from the upper circle of soundhole $\frac{1}{8}$th.

This bar is slightly shorter, and also slightly wider than the original, which also had been placed a little more oblique than the modern bar.

CHAPTER XI.

AN important feature of the internal arrangements of the violoncello is the soundpost. Together with the bridge and the sound-bar, it influences the vibrations of the instrument in a very direct and forcible manner.

The soundpost is peculiar to instruments played with the bow. Stringed instruments of percussion, like the pianoforte; or instruments played with the plectrum, or plucked with the fingers, like the harpsichord, the mandoline or the guitar, have the soundboard, and some form of sound-bar; but they do not possess that most important feature of the violin tribe, the soundpost, and it is to this peculiarity that we must look for an explanation of some of its functions.

Numerous experiments have been made in order to reduce these functions to a scientific formula, and, in many cases—as with similar experiments to the bridge, sound-bar, and plates of the instrument—one truth has been discovered, and this has been seized upon and wrongly set up as the whole end and aim of this piece of mechanism.

Thus one discovered that the soundpost established a nodal-point, and caused the production of over-

tones; another that the upward pressure of the post neutralized the weight of the bridge; and again, that the post centralized the vibrations after being carried the length of the plate by the sound-bar, and so on.

Hart says:—"It is the medium by which the vibratory powers of the instrument are set in motion; it gives support to the right side of the belly, it transmits vibrations and regulates both the power and quality of tone."

Heron-Allen says:—"The object of the soundpost is not so much to communicate the vibrations of the belly to the back, as to render the vibrations of the two plates similar (or normal) whilst it communicates them," and again, "the soundpost has therefore the same effect upon the belly and back as the bow has on the strings; it continues the vibrations and keeps them regular with one another."

Now, although these authorities seem contradictory, they are both more or less right in some degree. The only matter is that neither of them has exhausted all the functions of the soundpost. Although scientific research has made such wonderful progress during the past two decades, our knowledge of molecular activities is still very incomplete, and the laws which govern the vibrations of an instrument of such simple construction as the violoncello are less easily understood than those which are brought into play by a machine of more complex construction.

To return to some of the elementary truths relating to the soundpost. It should be constructed of well-seasoned pine. The wood need not be of the 200-year-old Swiss pine we read so much about. It is a fact that

wood, if too old, especially if it has been kept in an atmosphere too dry, loses much of its elasticity of fibre.

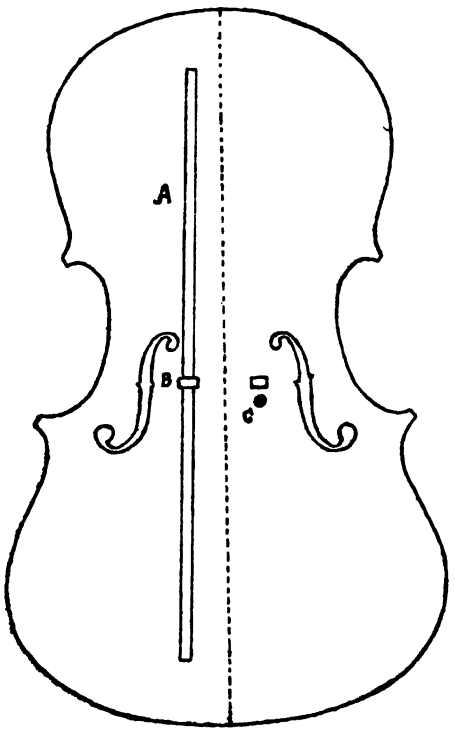


DIAGRAM 2.
(*a*) Bass-bar. (*b*) Bridge-feet. (*c*) Soundpost.

This strength and elasticity of fibre is, to my mind, the chief desideratum of violin wood, and particularly

of the soundpost. It should be made of straight-grained pine, which is not of too great a density of fibre, and in most cases the reed should be much in evidence—that is to say the wood, although of a soft nature, should not be too pulpy.

Some few years ago I had several modern violoncellos which were fitted with pitchpine posts. These posts, instead of being cylindrical, were left square. The result was, in every case, a very decided deadening of the tone.

Let me explain to the tyro that the post should not be glued in position. It should be cut of such a length that if the pressure of the bridge be removed the post just keeps in position. If the post is too long, it forces the back and belly apart, and this is very detrimental to the tone. If the wood used in making the soundpost is not sufficiently seasoned, a certain amount of shrinkage takes place, and, in course of time, the tone of the violoncello is found to be feeble and dull; this may also occur from other reasons; from the plates warping, or the back being pushed out with the pressure of the post. I have had several instruments of the Grancini and Testore types where the backs were constructed of pear, or poplar, which have had this defect in a marked degree. In one instance, quite a large protuberance showed on the back, and this was found very difficult to remedy. It was successfully accomplished in the following manner. The part under the post was thoroughly soaked with water by the application of wet rags. A thick block of sycamore was glued over the spot, and the back pressed and clamped tightly to it. The back was left for several days so that the

moisture would evaporate, then the block of sycamore was carefully reduced. By this means a soundpost of proper length could be fitted, and the tone was materially improved.

The thickness of the post should not be governed by the width of the centre of the soundholes, but by the actual requirements of the particular instrument. This may seem superfluous, but I can assure my readers it is not so. In quite a number of cases I have discovered that the tone of an instrument has suffered owing to the soundpost being too thin. On removing the post and attempting to fit another, I discovered the reason of this defect. The soundholes at their centres were so narrow that it was impossible in the ordinary way to insert one of stouter dimensions. On remarking on this to a maker, I was astounded to hear him reply :—" Yes ! I have had several instruments like that. The best way is to cut away the F-hole, so that a thicker post can be fitted." I am afraid this has been done pretty frequently in the past, not only to fit a stouter post, but with the crude idea that a large soundhole would " let out the sound,"—and thus one often comes across instruments which have been irretrievably ruined.

Now, if the instrument requires it, it is a very simple matter to fit a stout post, even if the soundhole at the centre is too narrow to allow of its being introduced in the usual manner. The most obvious way is to pass the soundpost through the lower circle of the soundhole ; insert the post-setter through the centre of the F as usual, and pick up the post ; then adjust in the usual manner.

If the post is too thin, the tone will be thin also; if too thick, too heavy—or if the wood has deteriorated with age—the tone will be more or less muffled. The position of the post, however, is of perhaps even more importance than the material of which it is composed.

It should be placed in a line with the centre of the right foot of the bridge, at about the distance of half an inch. If the model is decidedly flat, the post may be adjusted slightly further away; if the instrument is of very high model, the post may be placed slightly nearer. In adjusting the post, it is necessary to remove the end-pin, so that it is possible to see when the post is perfectly upright. The ends of the post should be slightly on the bevel, so that a perfect fit is accorded to each end against the curves of the upper and lower table. The grain of the post, as seen at the upper end, should cross the grain of the upper table.

The soundpost, by its simple construction and manner of fitting, is the one feature which is most often experimented with in order to improve the tone of a faulty instrument. A violoncello bridge requires some skill in craftsmanship to fit properly, and the bass-bar requires the upper table to be removed before experiments can be made with its construction or position; but the soundpost is so easy to fashion and fit in place that many amateurs make the attempt to improve the tone by an alteration of this very simple organism. A few hints on the effect of the different positions of the post will therefore be of interest.

It is useless to attempt to correct faults of a glaring nature by the soundpost alone. Personally, I always insist that the correct procedure is:—First, the bass-

bar. An experienced and thoughtful workman will know by the model, thickness and density of the plates, and other matters which he alone can grasp, the particular style of bass-bar to insert. Accepting this fitting as correct, then much can be done with the bridge and post. The bridge should follow the bass-bar in point of priority, as this is also regulated by—or in conjunction with—the set of the neck. When these two features have been fitted according to the special requirements of the particular instrument, the delicate final adjustments can be made, and these adjustments corrected by aid of the post.

If the A string is too weak, and a corresponding harshness is noticed on the lower strings, move the post slightly nearer the soundhole; that is, away from the centre of the instrument. If the D string is dull, and the A string harsh, move the post further towards the centre of the instrument. In making these adjustments, it must be remembered that as the centre of the instrument is approached the distance between the plates increases, thus requiring a slightly longer post.

My opinion has been asked with respect to the hollow soundpost, and other inventions of a similar nature.

Experiments have been made with soundposts of glass, of cane with hollow centre, square posts, and various shapes of hollow posts with holes drilled crossways in various positions. In some cases I have found the hollow post of use, but generally speaking these are all more or less useless innovations. The hollow post is occasionally of advantage to correct certain inherent faults in the construction of the plates. If

a hollow post is fitted, it should be one made by a firm of repute, and not one of the home-made variety. Only recently I had an instrument which had every appearance of possessing a splendid tone. This instrument was of good proportions, well made, the wood of good quality and appearance, the varnish was equal to any of the old English school. It was beautifully fitted with neck and bridge correctly adjusted, and yet the tone—especially on the A and D strings—was poor and dull. This violoncello had been the *bête-noir* of several well-known professional players who had been attracted by its appearance, but were simply appalled with its poor muffled tone.

After trying it for a week to become accustomed to the character of its tone, and the idiosyncrasies of the instrument, I made an attempt to remove the soundpost. To my amazement it simply crumpled away. On removing the pieces, I found it was a hollow post of home construction. The fibres of the wood, naturally weakened by faulty boring, had withered away, and on the slightest touch with the post-setter it simply fell to pieces. After I had fitted a new post the instrument turned out one of the finest for tone I had tried for many long years.

Diagram 2 illustrates the relative position of bass-bar (note how it is splayed from the centre joint), bridge and soundpost. The positions of these interior fittings are given as they would be seen if the upper table were transparent, and they could be viewed from the exterior of the instrument.

CHAPTER XII.

ONE of the most difficult operations in the adjustment of the violoncello is that of grafting a new neck.

From the numerous letters which I receive on the subject, I am tempted to think that in the provinces, at any rate, there is a great scarcity of repairers who are willing to undertake this exacting operation. One cannot be surprised at this. In grafting a new neck to a violin, the operation requires extreme accuracy of measurement and cutting, and calls for the highest skill in craftsmanship; but in performing the same operation on the violoncello, in addition to this accuracy, the work entails quite a heavy piece of joinery.

There are various methods of grafting; that known as the English (see diagram 3) is perhaps the easiest, and although it entails cutting away a little more of the original scroll-wood than is the case with some of the Continental methods, it is more suited to the capabilities of the amateur. The French method (diagram 4) is more frequently employed, this necessitates a cross-cut in the front walls of the peg-box, which is very difficult to get sufficiently true to give a good joint.

To describe the English method roughly. The upper end of the graft is cut to a wedge, the interior of the peg-box is cut away to receive this solid wedge (see diagrams 5 and 6), the interior of the peg-box is

DIAGRAM 3.

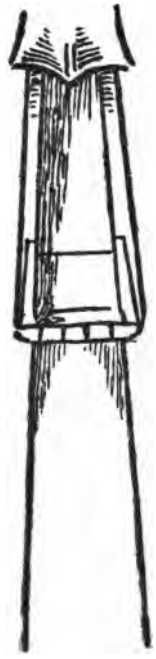


DIAGRAM 4.

then once more excavated, and the peg-holes re-bored. Great care must be taken that the sides of the wedge are cut perfectly true, so that the scroll when fitted is in perfect line with the neck.

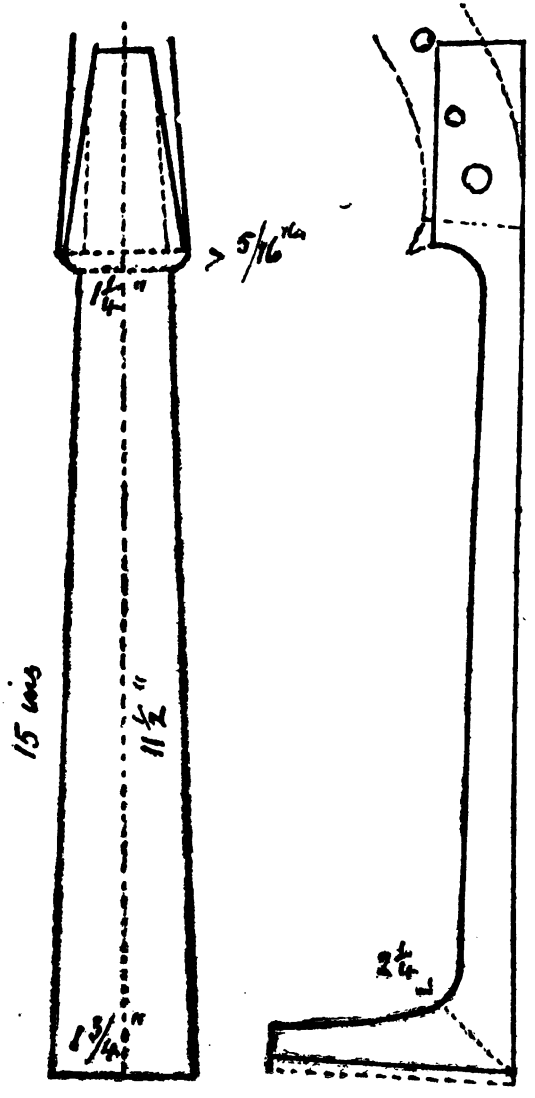


DIAGRAM 5. DIAGRAM 6.

In removing an old neck from a violoncello, the utmost care should be taken to prevent the sides of the mortice in the upper block from being torn away. The usual procedure is first to cut off the scroll, then to make a clean cut right across the root of the neck as close to the body as possible. Whilst performing this operation, the amateur should look to see if the original neck has been secured with one or more nails.

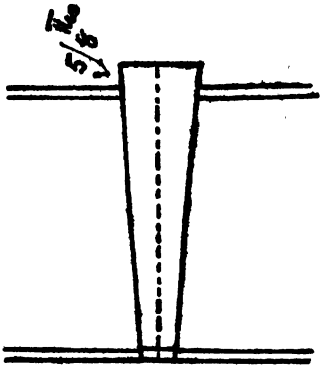


DIAGRAM 7.

It was quite customary in olden days to drive nails right through the upper block into the root of the neck. If one or more nails are present, they should be forced through into the interior of the instrument, then the saw once more can be brought into use, and the remains of the old neck cut a little closer to the body.

When this has been done, the wood which remains in the mortice must be chipped away with a joiner's

chisel, and the cavity made perfectly clean and true to receive the new graft.

At this stage of the proceedings it is as well to see that the mortice is exactly central. In many old Italian instruments the neck may have been quite out of line with the centre of the body; now is the time to remedy this defect. If the sides of the mortice have been torn, or it is found that the excavation is not central, it may be necessary to fill up the mortice and re-cut. This is generally accomplished in the following manner. A straight, clean cut is made at one—or if necessary at each—side of the chamber; narrow slips of wood, corresponding in length to the depth of the ribs are then glued in position, and firmly wedged. The mortice is then re-cut. In order to keep these slips of wood in position until the glue is set, they are wedged firmly against the sides of the chamber by sticks placed cross-wise.

Before proceeding further, the button, *i.e.*, that part which projects above the rim of the back of the violoncello, and against which the root of the neck fits, should receive attention. If the old neck has not been fitted true to the central line, it follows that the button may also not be central. In many cases it is found that the button has been damaged, or that it is insignificant in character, and quite unworthy of the instrument. The usual method is to affix an ebony margin; this is also done in cases where the button is not of a proper size to allow the root of the neck to be of proper proportions.

Some purists object to this ebony margin around the button, but personally I think it is highly effective

and ornamental. It is quite true that a few years ago it was applied indiscriminately, but where it is required the repairer need have no hesitation in introducing it.

To return to the graft. The upper surface, *i.e.*, that part which is to receive the fingerboard, is planed to a good level and made perfectly smooth. The distances at the upper and lower ends are accurately measured and marked off, as diagram 5. All repairers keep templates for these standard measurements, such a template is used to mark off the lines and curves at the upper part of the graft, although at first this can only be cut approximately, as this curve must be cut according to the shape of the under part of the scroll. The root of the graft is cut to a template giving the necessary angle at which the neck has to be set, and here the question arises whether the button is to be left intact, or whether it is to be re-lined. If the former, the root of the neck is only cut roughly to shape, the final trimming is done after it is fixed; if the button requires to be treated, the root of the neck is finished except for a final polishing, and the ebony rim of the button is trimmed down to it.

The neck should project sufficiently above the body of the instrument, to allow a sufficient clearance of the fingerboard, and this affects the fingering to a considerable degree. A good and useful distance is shown in diagram 7.

The standard measurements are as follows:—

Length of graft from peg-box to root of neck, 11½ inches.

Width of upper surface at the lower part, 1⅝ inches; at the upper part where it enters peg-box, 1¼ inches.

If the English method of grafting is adopted, the graft must extend to just below the third peg-hole, this will give a length of graft of about 15 inches over-all. If the French method is used, the graft only extends to just below the second peg-hole, requiring a graft of roughly, say 13½ inches.

At the point of entrance into the peg-box, the face of the graft is carried on five-sixteenths to receive the nut, that piece of ebony over which the strings pass.

I must here make some remark about the "stop" of an instrument. The length of stop can only be influenced very slightly by the length of graft. That is to say, it is useless to attempt to shorten the stop of a full size violoncello by fitting a very short neck. The stop is influenced by the distance from the centre of the sound-holes to the shoulder or the upper part of the body. If the soundholes happen to be cut very low, as is sometimes the case, it is necessary in order that the bow does not come in contact with the corners, that the bridge be placed a little nearer the top of the sound-holes. If this fault is very evident, the only way to get over the difficulty is to fill up the sound-holes and re-cut. Therefore, providing the instrument is properly proportioned, it is advisable to fit a full size instrument with a graft of standard length. If a shorter graft is fitted, the notes in the fourth position, the position which is directly over the junction of neck and body, will be in a very awkward place.

The stop of the violoncello under notice is 15½ inches, this measurement refers to the distance from the centre of the bridge to the extreme edge of the upper part of the body.

With a length of vibrating string of, say, 27 inches, the note A given at the half-string should occur at the distance of not more than two inches below the junction of the neck and body. It is quite evident if a very short neck is fitted to an instrument of full size, this note at the half-string will be in such a position that it will not be easily reached from the neck position.

CHAPTER XIII.

THERE are three small fittings of the violoncello which are often passed over as unimportant, but which I shall show have a great influence on the correct adjustment of the instrument, as well as materially affecting its appearance.

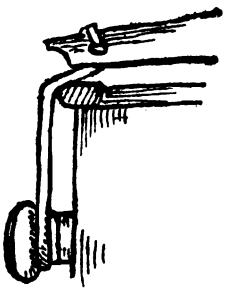
These are the saddle, the nut, and the button. The last-named is really a projecting part of the back, but as mentioned in Chapter 12, it often has to be edged or lined with ebony, when it takes its place as a "fitting," and so forces itself under our notice.

The saddle, as previously described in Chapter 7, is a small piece of ebony over which passes the tail-gut. Many otherwise well-informed and careful writers on stringed instruments persist in calling this the "nut," or the "lower nut"; thereby confusing it with that piece of ebony at the peg-box end of the fingerboard. It is a pity that this confusion should exist over so simple a matter—the term saddle is much more applicable and far preferable.

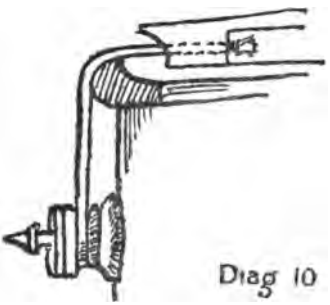
It is absolutely essential that the saddle should fit properly. Unlike the nut—which has a good support

against the square end of the fingerboard—the saddle must depend on its close adhesion to the lower block

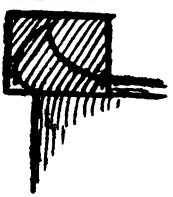
Diag 8



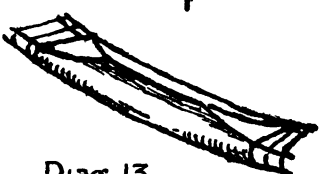
Diag 9



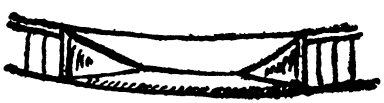
Diag 10



Diag 11



Diag 13



Diag 12

for its power to resist the pull of the strings. It has very little assistance from the edge of the upper table, especially in old instruments, as the table at this

point is often weak, or has been weakened by repeated removals when the instrument has been undergoing repairs.

In ancient times, the saddle did not assume the importance that it does under modern conditions. The tension of the strings was not so great with the old pitch and a low bridge, and the method of affixing the tail-piece was different to our modern method. The fitting of the tail-piece was more or less like that used for the viola-da-gamba. Diagrams 8 and 9 will illustrate this point, it will readily be seen that a much greater forward pull is given by the modern tail-piece in comparison with the old style, the pull of which was more in an upward direction.

Many old instruments which I have seen in their original condition have this old form of saddle. It was constructed of a straight slip of hard wood—often pearwood, or beech—stained a dark brown, or perhaps black. Its purpose was merely to prevent the gut, or copper wire, which ever was used to affix the tail-piece, from cutting into the upper table.

With our modern tail-piece, a saddle is required which projects higher from the plane of the upper-table. Only in this manner can sufficient clearance be obtained. According to a very simple rule in mechanics, the higher this saddle projects above the table, the more is it likely to succumb to the increased forward pull. It is evident, then, that this simple little fitting must be properly executed, if it fulfils all that is required from it.

In fitting a new saddle to an old instrument, the procedure is as follows. Select a piece of ebony, say

2½ inches by ½ inch in depth, and of a width which will correspond with the width of the border of the table, measuring from the inner line of the purfling. The inner line of the purfling should run smoothly into, and be continued along the inner edge of the saddle, and the outer edge of the table should also run smoothly with the outside of the saddle.

First see that the incision in the upper table which is to receive the saddle is perfectly central, otherwise the tail-piece will not pass over the centre when the saddle is adjusted. Having arranged this, and carefully cleared out the space so that the three sides of the excavation and the exposed upper surface of the block are quite true, the piece of ebony may be cut to fit.

A better fitting can be made if the block of ebony is first "trued up," and the incision in the table is carefully traced with a point—not a pencil—then the pine is cut to fit. It will be seen, however, that if the operation is repeated, the saddle must encroach further and further into the valuable surface of the instrument. Do not make any attempt to shape the outer surfaces of the saddle at this stage, leave it as a somewhat rough oblong piece of ebony, see diagram 10. When fixing in position let the glue be hot and strong, and also warm the piece of ebony so that the glue does not set before it is in position. Give one or two extra dabs of glue to the lower block, as the pine soaks up the glue more rapidly than does the ebony. Now press firmly into position, and with a rag moistened with warm water, carefully wipe off all superfluous glue which may ooze out of the joints.

In all repairs to stringed instruments this precaution

of not allowing the glue to set on the surface of the varnish should always be taken. Whilst the glue is warm it is easily removed, and the place cleaned with a moist rag; after the glue has set hard, there is a danger that it will bring away some of the varnish if drastic measures are taken to clean it off.

If the saddle has been well fitted and properly glued, there will be no need to use the clamps, but it is better to err on the safe side. See that the clamp is adjusted properly, and that the saddle does not move in the slightest degree out of position when pressure is applied. I find the single screw clamp is preferable to the old-fashioned double-screw wooden one. The single screw iron clamp is more readily adjusted, and the pressure can be gauged more readily.

When the glue is thoroughly hard the clamp may be removed, and the saddle trimmed to shape, see diagrams 11 to 13.

A line is ruled slightly nearer the outer edge than the centre, and measuring one third from each end; this central portion is left intact, the parts at each end are carefully pared away until the ends melt into the upper table. The wood at the inner side of the line is also carefully pared away, and finally rubbed down with fine glass-paper wrapped round a suitable holder until it attains the requisite shape; the outer edge of the saddle being finally trimmed and smoothed until its outline coincides with the outline of the lower edge of the table.

The dull smooth polish which looks so well in ebony can be produced by using the finest emery cloth, moistened with oil. Linseed oil slightly thinned with tur-

pentine is generally used, but some makers and repairers prefer the slightly thinner and more transparent poppy oil. It is of no consequence so long as a drying oil is used, or an oil that will evaporate. Some oils, olive oil for instance, turn rancid, and soak into the pores of any exposed surface of the wood.

CHAPTER XIV.

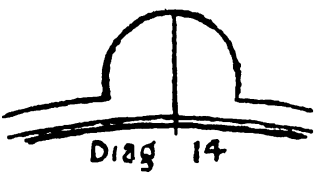
ALTHOUGH the button is an important part of the anatomy of the instrument, undue importance should not be given to it after the manner of cranks and faddists.

It seems there are cranks on every subject under the sun, but one would think that this small semi-circular piece of wood—so small that it can well be covered by a halfpenny-piece—would have escaped their notice. Such is not the case however, and there are many so-called experts who will appraise or condemn an instrument solely on the evidence furnished by the particular shape of the button.

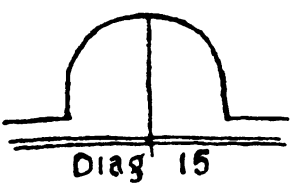
It often happens that an instrument of fine proportions and massive bold outline has a button of such a miserable weak character that one can only come to the conclusion that it has been whittled down out of all shape by successive repairers. It would seem a pity then to condemn such an instrument on this evidence alone. It is quite a common occurrence for the button to be damaged; the neck sustains an injury, perhaps it is knocked off completely, dragging the button off with it; or perhaps the instrument has had more

than one graft fitted, and at each operation a trifle is taken off the button to make it fit the root of the neck. An instrument goes through many vicissitudes in the course of a couple of hundred years.

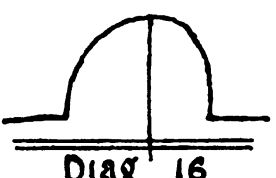
The outline of the button should correspond more or less with the main characteristics of the outline of the



Diag 14



Diag 15



Diag 16

instrument, and one notices that in the early instruments by Stradivari where the curves are rounded, the button is more or less circular. Indeed, in some

of his early violins the button is an exact semi-circle, see diagram 14. In this manner the greatest of all makers sought to repeat and accentuate the curves of his instrument in that crowning piece of the back.

If the instrument is of an exceptionally angular character, such as one finds in the instruments of Carlo Bergonzi—or, rather, in the instruments attributed to this maker—the button will be further removed from the circular, and should approach more and more to an oval, indeed, in some cases, it should be an oval with the sides considerably flattened. See diagram 15.

The repairer will see from the above remarks that each instrument should be treated differently in this matter of re-edging the button. It is of no use to have a stock template for the root of the neck, and to fashion the button of every instrument, no matter what its characteristics, in accordance with the stock shape.

I do not know at what period the vogue of re-edging the button came into prominence, but it is a well-known fact that many instruments have had this operation performed on them when there has been no reason whatever for doing so. In days gone by, the button was left severely alone by repairers, any attempt to restore it to its proper shape was considered vandalism. Repairers had to fit their new grafts to whatever shape of button happened to be left on the instrument. Then the pendulum swung to the other extreme; certain firms noted for the excellence of their repairs introduced the ebony edged button, and after this, every instrument which had to be re-grafted must, of course, be treated in similar fashion.

Personally, I like the appearance of this ebony

margin, and providing the original button of good proportions has not been tampered with in order to fix this useful decoration, I see no grounds for objecting to its use.

Diagram 16 gives an example of an ill-shaped button, taken from a valuable old Italian instrument. It will be seen that it is an impossible task to attempt to graduate the root of the neck to such an ill-shaped abomination, and this is a case where the operation of re-edging is fully justified.

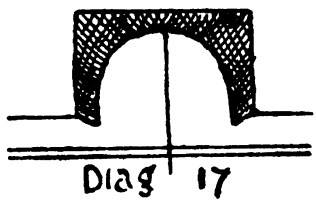
The method of performing this operation is as follows: Prepare a flat piece of ebony the thickness of the back of the instrument at its margin, and somewhat larger than the button will be when finished. Out of a piece of veneer cut a small template to the exact shape which it is intended to give the inner edge of the margin. Now with a steel point trace the outline, first on the original button, and then on the piece of ebony.

Here let me explain why I always recommend the use of the steel point for tracing outlines which have to be cut with a great degree of precision. No matter how fine you make the pencil point, it gives a rough ragged line, whereas the line produced with the steel point is more or less an incision, and a keen-eyed workman will fit the edge of his chisel or gouge into this microscopic incision, and making it part of one clean cut, give you a perfectly true edge without any further glass-papering.

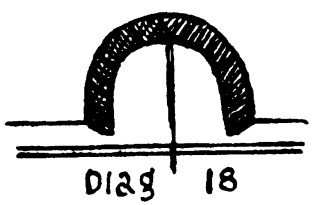
Some repairers say, "Trace the outline with a fine pencil point, and then cut along the centre of the pencil mark." This is all right for large sweeping outlines which have later to be trimmed up with file or sand-

paper, but in every case where a clean cut has to be made, and especially where the portions cut have to be made into a close-fitting joint, the steel point is a necessity.

We have now arrived at the stage where the ebony margin has been cut at its inner edge to fit the outline



Diag 17



Diag 18

given the button, both these edges must be perfectly smooth and true. Observe the little wedge-shaped cuts at the base of the margin. The next procedure is to glue the margin to the root of the neck—if a neck is already fitted, carefully wiping away any glue that exudes from the joint during the operation. See diagram 17.

When the glue is perfectly hard, the rough margin may be trimmed to shape with a very sharp chisel, taking only very small parings, and working away very gradually until the base of the neck is reached. The work must then be finished with fine glass-paper, and in this case it is usual to give the ebony a coat of hard spirit varnish, the same as is used for violin necks. The varnish when hard is rubbed down and polished until it takes the dull shine which matches the old varnish already on the instrument. See diagram 18.

CHAPTER XV.

IT is of little use to own a fine violoncello if the ordinary laws relative to its well-being are not understood. These are so simple that at first sight it seems absurd to imagine that anyone can err in the matter; one has only to inspect a number of old instruments to prove that—in times gone by, at any rate—both ignorance and carelessness have ruined many fine examples of the luthier's art.

An instrument of such proportions as the violoncello is more liable to accident than is one of lesser bulk. It is an unwieldy travelling companion, and seems always to be in everyone's way. The first care, then, should be to provide a proper travelling case. Personally, I prefer—and have used for a number of years—a very substantial case of American leather. I always make it a strict rule to act as my own porter, and never, under any pretext, allow anyone to carry my violoncello. If the travelling violoncellist objects to follow my example, it is necessary to use a stout wooden case; the variety known as the English club-head is the best; the violoncello can then be trusted to the tender mercies of servants and railway porters.

When sending a violoncello by rail, unaccompanied by the owner, certain extra precautions should be

observed. Always see that the instrument is tightly packed; many injuries are caused by the instrument shaking about in the case. See that the space between the scroll and the head of the case is wedged tightly with a pad of newspaper, and the same at the lower end, and at the corners. This precaution will assist the violoncello to resist any slight shocks, the newspaper pads acting as buffers. An important matter in selecting a wood case is to see that plenty of space is allowed over the bridge. In the lid of the case is a kind of cavity into which the bridge projects; the bridge should not fit into this part of the lid at all tightly, or the slightest shock may cause damage. If these hints are attended to, and the case is sufficiently strong, no harm is likely to occur under normal conditions. Make it a practice always to insure an instrument to full value when sending by rail.

I object very strongly to the modern waterproof canvas case. This requires some explanation, as of course these canvas cases are in almost universal use. If you must have one, try and obtain one of the very best make, then some of the objections here raised against them will be invalid. The majority—especially of the cheaper kind—are rough inside, and made of very stiff material. A case of this description does not offer any resistance to knocks and blows, and if the violoncello fits at all tightly there is great danger of damage in putting on the case and taking it off. If a strap or handle is fitted to the side, and is used for carrying purposes, a great strain is placed on the bridge. Then again, the use of the bow-pocket, especially in the hands of a careless or forgetful person, is highly

dangerous. I have often stood in abject terror whilst pupils have been taking out their violoncellos, and in many instances—after a painful struggle in which both the instrument and the ornaments on the mantelpiece were in danger—a timely reminder has just saved the life of the bow, which, inadvertently, had been left in the bow-pocket. It is a good plan, if the bow-pocket is used, to enlarge it sufficiently so that a narrow slip of wood can be permanently fixed along the whole length of it. Then if, by chance, the bow is left in, it has some support against accidental pressure. The better plan is to have a separate bow-case, made of wood. This can be strapped to the case, if there is any danger of it being left behind, or forgotten in the excitement of preparing for a concert.

One of the most common causes of deterioration and damage is the common habit of leaving the instrument either lying about or standing in a corner of the room. A recital of the damages caused by carelessness in this respect would need many chapters. Scores—nay hundreds—of times I have pointed out the danger to pupils, to be met, in nearly every case, with the reply, "Oh! it's quite safe! No one ever thinks of coming into this room, or if they do, they always look out for the 'cello."

An instance where a pupil was thoroughly cured of the habit of leaving the instrument about is worth quoting. In the midst of his morning practice my pupil was called out of the room, and adopting his usual plan, he placed the violoncello safely on the floor on a nice soft skin rug in front of the fire. The bow was carefully placed on the instrument, and casting a loving

look at it as he carefully closed the door, or, rather, he always affirmed that he closed the door, my pupil went to interview the caller. About half-an-hour later he was alarmed at the various peculiar sounds issuing from the music room, and what met his gaze as he returned to investigate could only adequately be described by a much more fluent pen than mine. His young puppy had gained access to the room, and tiring of his attempt to devour the ivory frog of the valuable Dodd bow, was playing fetch and carry with it, whilst the violoncello lay blistering in the heat of the fire.

In days gone by it was quite common to see an old violoncello hung up by its neck in the kitchen of some old out-of-the-way farmhouse. The owner would tell you proudly that it had hung there ever since grandfather played it in the village church, at a period before organs were distributed by a generous and philanthropic millionaire. At one time, I was lucky enough to rescue a valuable Italian violoncello from such an invidious position; it had hung by its neck until the glue had perished, and the body had noisily crashed to the floor, much to the dismay of the old dame, its owner, who took the catastrophe as a "token."

I hope none of my readers adopt this plan of hanging up the violoncello on the kitchen wall. A violoncello exposed to the varying atmosphere of a kitchen is exposed to many dangers. The wood first soaked with moisture, then dried with excessive heat, is bound to warp and twist, and before long the tone suffers considerably. An instrument so exposed is also the happy hunting ground for flies, and a convenient hibernating place for them during the winter.

I am often asked what preparation I use to keep my instrument in such fine condition. My answer is generally very disappointing to those pupils who imagine that a bottle of some special kind of liquid will take the place of years of constant and regular attention. My plan is always to wipe off the resin from the fingerboard and the table immediately after use, and put the violoncello straight away in its case. Luckily, I am the possessor of an unique case. It is in the form of a music cabinet, and was made to my own design. It was an attempt to show that a convenient receptacle for the violoncello could be constructed which should, at the same time, be a pleasure to look at. Besides being a pleasing piece of furniture, it stands there positively inviting you to replace the instrument immediately you have finished with it.

To the orchestral player the following hints may be of service. Make it a regular practice to dust off the resin each time the instrument is used; in spite of this, a certain amount is bound to adhere to the fingerboard; now take a rag and sprinkle on it a few drops of spirit—Eau-de-Cologne, or methylated spirit—and rub the fingerboard briskly. Care must be taken that none of the spirit touches the varnish on the body of the instrument, or that will be removed also. A few drops of poppy oil may be rubbed all over the instrument occasionally, and will help to feed the varnish and keep it in lustrous condition.

To sum up. The instrument should be protected from damage by the use of common-sense and foresight. It should not be unduly exposed to varying temperature. An excess of moisture is harmful, so is an atmosphere

which is too dry. In this country, however, there should be no difficulty in choosing a suitable place in which to keep the violoncello. I suppose no one would be so absurd as to keep the instrument in the airing cupboard, or near hot water pipes. A pupil in India informs me that at certain seasons the atmosphere is so humid he has to place pieces of lime in his violoncello case. At first when he went out there, and did not know of this precaution, his instrument was constantly coming off the glueing, or, as he termed it, "unstuck." The effect of the lime is to absorb the excess moisture.

CHAPTER XVI.

A WORK on the violoncello would be incomplete if it did not contain some reference to the bow. This part of our subject has been so ably treated already in that admirable book, * "The Bow: Its History, Manufacture and Use," by Henry Saint-George, that my remarks must only be confined to generalities.

If any of my readers is the lucky owner of a good bow, I should advise him to treasure it with loving care. In nothing appertaining to stringed instruments —unless it be in the matter of the strings themselves— have we proved so dependent on the foreign producer as in violoncello bow making.

It still seems possible to come across a fairly good violin bow at a reasonable price, but the violoncello bow seems to be absolutely off the market. A short time ago I personally went to nearly a dozen of the largest dealers in London to try and purchase bows for my pupils, and I found it was absolutely impossible to come across a bow which was at all fit to use under the price of £5. The usually good Continental bow of the better class, retailed at about £2, was nowhere to be found, and in its place was either an extremely poor substitute, of poor wood and worse fittings, or the price was too high for the average amateur.

* Strad Library, No. 3.

Now is the time for the craft of bow-making to be taken up with vigour; in the work previously mentioned the author says the whole operation connected with the making of a single bow can be accomplished in one day. If that is the case, it should pay any expert craftsman to devote his attention to bow-making; by grading the sticks into three qualities, and selling at £2, £3, and £5 each he would soon reap a handsome reward.

Personally, I have used a bow by Hill and Sons for the past fifteen years, and although I have had several of these fine specimens of the bow-maker's art, it seems I must have had a love for one bow in particular, as I find I always use this particular bow in preference to the others. Many of my pupils cannot credit the statement that I have used practically one bow during the whole of this period, I will therefore give some hints on the care and preservation of the bow.

On receiving a new bow from the maker, or one that has been re-haired, it is advisable to adopt the following plan. If the bow has been already resined these hints do not apply. Take a clean linen rag, moistened with petrol, or methylated spirit, and rub the hair vigorously on both sides of the ribbon. Do not touch the stick with the spirit; it does not seem to affect the polish on some sticks, but on others the polish is affected straight away.

The effect of the spirit on the hair is to take away any grease which may happen to be there, and to give a perfectly clean surface in readiness for the application of the resin.

When repairers resin a newly re-haired bow, they

apply powdered resin in the following manner. A cardboard box, the full length of the bow—usually a box in which bows are shipped from abroad—is kept for the purpose. The powdered resin is spread evenly in the bottom of the box, and the hair of the bow is placed quite flat in the resin, which is vigorously rubbed in with a stubby hog's-hair brush. In this manner, the resin adheres thoroughly to the new hair ; the surplus is then flicked off, and afterwards the bow is resined in the usual manner. If this procedure is not adopted it takes quite a time for the resin to adhere to the hair, and indeed, it never seems to permeate quite through the ribbon.

The hair of the bow, when once resined, should never be touched with the fingers. It is a matter of surprise to me to see so many bows with a dark stain—more or less greasy—for an inch or two at the heel of the bow. The only explanation is that players make a practice of taking hold of the bow in such a manner that the fingers come in contact with the hair, the warmth and moisture of the hand melts the resin which, becoming sticky, causes the dust to adhere. Immediately after use, slacken the tension on the stick, shake off the resin from the loosened hair, and put the bow away in its case, or at least away from damp and dust. If these precautions are attended to, the hair of the bow will be as clean and good after a year of constant use as when new.

After a bow has been in use for some time, it will be noticed that the hair becomes thin, and that it has taken on a slightly glossy appearance. It will also be found that the resin does not adhere so well, causing

the bow to whistle or squeak over the strings instead of giving out a pure round tone. This is a sign that the bow requires re-hairing. Most amateurs neglect this, thinking that if the ribbon of hair looks fairly broad and thick it is all right. A professional, working three or four hours a day, should have two bows in alternate use, and each bow should be re-haired at least every six months. An amateur who does not play more than an hour a day should, with care, make a bow last, say, a year.

The lapping of the bow should be kept intact. In attending to this, the wear on the stick is reduced to a minimum. Messrs. Hill and Sons have a very good patent lapping, made of a two-coloured strip of whale-bone. I find this superior to the ordinary silvered thread which is generally used, the latter soon wears through, and does not give that firm grip which the whale-bone lapping gives. At the lower end of the lapping a thumb-grip of leather is affixed, this thumb-grip should be frequently renewed so that the wear of the stick at this point is reduced to a minimum.

The comfort of the player depends, a great deal, upon the shape and finish of the frog. If the upper portion—that part against which the thumb is placed—is at all pointed, it cuts into the tip of the thumb in a most distressing manner. The best bows are usually beautifully finished in this respect, although occasionally I have come across a good bow which had this fault. It is advisable to pare away slightly the ebony at this point, if it is found too pointed, but great care must be taken. It is wiser to ask the bow repairer to do this, or if attempted it should be smoothed down

very slightly with a nail file, or with a piece of fine sand-paper.

I am often asked how to wash the hair of the bow. If the foregoing hints are taken to heart there should be no need to perform this operation, and indeed, I do not think it desirable to attempt to wash the bow-hair. The better plan is to keep the bow away from dust, and if the hair is not touched with the fingers it should not require any treatment at all except the periodical re-hairing.

CHAPTER XVII.

THE remedy of common faults, and the repair of slight damages to the violoncello will now be treated.

One of the most common complaints from which the violoncello suffers is the tendency to give out certain sounds foreign to the note produced. These are termed by various correspondents, "squeaks," "rattles," "whistles," and other descriptive names according to the character of the particular sound produced.

To the expert, the distinctive character of the sound, and the part of the register in which it is produced help considerably to diagnose the trouble; at the same time, these rattles and squeaks are very annoying, and sometimes very difficult to remedy.

The first care should be to make certain that it is the instrument which actually is giving out the unpleasant sound, or whether it is produced by some object in the room vibrating in sympathy with certain notes. A loose picture glass, a photograph frame standing on the piano—why will people put ornaments, flowers and books on the piano?—or even the ordinary metal music-stand, if placed on a loose floor-board, direct in the line of vibration, will sometimes continue one note in most "unsympathetic" vibration.

A short time ago, I had such an instance brought to me. A pupil complained about a squeak on his violoncello; whenever he played it the squeak was there all right, but as soon as I took the instrument from his hands and played the same notes, the offending sound had vanished completely. It was the work of only a moment to discover that a coat-button just touched the back of the instrument, and on a certain note gave out a most unpleasant sound.

When the source of the trouble has been proved to be in the instrument itself, the usual procedure is to test the various parts which are likely to have come off the glueing. This is done superficially, by rapping the instrument with the knuckles, or by using a felt-headed hammer. First test all round the body of the violoncello where the ribs are attached to the table; if the glueing is intact, the sound produced should be musical—like that produced by a drum; if the glue has perished, and the table has sprung away from the ribs, a sort of double sound is at once heard. It is not always in the body of the instrument however, as I experienced some time ago. A violoncello which I was adjusting had a distinct buzz on one note, and try as I might, I could discover no reason for it. One maker suggested it was the bass-bar, but I could not agree to this. At last I dismantled the instrument, and found to my astonishment that the neck was loose; when the strings were tuned up to pitch, the pressure did not allow this defect to be noticed, but as soon as the tension was released it was quite apparent. A temporary repair was effected by running some thin glue under the root of the neck, using a very thin

palette knife. The tension was then once more applied, and the neck firmly cramped into position, and what was intended for only a temporary repair has lasted to this day.

If it is found that the table has sprung away from the ribs the method of glueing is as follows. If the injury is only quite recent, the glue may be applied without any preliminary cleaning, but if it is of long standing, and especially if an edging of thick dark-looking glue is in evidence, the part should be cleaned. This may be accomplished by dipping an old table-knife in warm water and working it about in the crack; it will be found that much ancient glue and its accompanying dirt is brought away on the knife, which should then be cleaned, and the operation repeated. The glue which has oozed out of the joint—the remains of a former careless operation—should now be scrubbed away, using an old tooth brush and clean warm water—no soap—and the place carefully dried. Do not use an excess of water on the instrument at any time: it has a habit of soaking into the interior, and trouble is then sure to follow. Now as soon as the place to be glued has been thoroughly cleaned, and the cramps have been adjusted so that they can be slipped on with only the slightest final adjustment, the hot glue should be carefully worked into the joint as previously described. The operator should assure himself that sufficient glue has been applied; this can be tested by pressing the parts together, if the glue oozes out of the joint, quickly adjust the cramps, and wipe away all surplus glue.

It is a good plan to provide several slips of wood;

on one side of each slip glue a piece of felt. Whenever any pressure has to be applied to the surface of the instrument, either by cramp or wedge, one of these felted slips should be placed with the felt side next to the instrument. If this is attended to, there will not be any of these disfiguring cramp-marks, so often in evidence on old instruments. Another precaution to be taken is not to apply too much force when cramping the table or the back to the ribs. Many old instruments are exceedingly thin in the ribs, and if the cramps are too tightly adjusted the ribs are inclined to "buckle." It is a safe plan to cease applying pressure as soon as the glue is seen to ooze out of the joint.

Most repairs—except those relating to the bass-bar—can be effected without removing the table. The latter is an operation which should only be performed for specific reasons, or as a last resource. In order to effect internal repairs without the removal of the table—or with only a portion of it taken off the glueing—many ingenious tricks are practised; and indeed much ingenuity is displayed by a resourceful workman to "get over" specially tricky repairs, where a man without any imagination or resource would remove the table as a necessary preliminary.

A fracture of the ribs often requires to be strengthened by the addition of studs—small pieces of wood glued across the fracture to strengthen the joint. There are several ways of affixing these studs; one of the most common is simply to insert them—already glued—one at a time on the end of a pointed wire; this is quite easy if they have to be placed in a position easy of access through the soundhole. If it is impossible

to reach the part to be studded by this means, the repairer may find it necessary to release a portion of the table, this can then be wedged up, and the interior of the instrument approached through the aperture.

A plan which I have followed when it has seemed feasible or when there has been any objection to disturbing the table even in a small area, may be worth relating. It sometimes happens that it is necessary to apply a fair amount of pressure to the inside of a fracture in order to force the adjacent parts outwards until they are in perfect line; if the fracture happens to be in such a position that it is not easily reached from the outside, prepare a special stud, rather stouter than usual, and with a small hole drilled through the centre. Now through the fracture itself push a large needle attached to a double thickness of stout linen thread. Whilst retaining one end of the thread outside the instrument, allow the needle to come through the soundhole. It is an easy matter now to attach the stud, detach the needle, and, after glueing the inner side of the stud, pull it close up to the inside of the ribs, and sustain the pressure by tightly securing the thread to the cramp. When the glue is set, the thread can be cut off quite close to the ribs, and if the operation has been successfully accomplished, it requires a person with good eyesight to discover the method which has been adopted.

If the edges of the fracture protrude outwards, a much more simple plan is adopted. First make all necessary adjustments to the cramps, so that they can be placed in position immediately. Have at hand the felt-covered slips, and also some specially prepared

wedges. Run some thin glue into the fracture, wipe off any which oozes to the outside, and adjust the cramps. Before much pressure is applied, place a piece of paper over the fracture, to absorb any glue which may still ooze from the crack when more pressure is applied, and over this place one of the wood slips, so that it covers both sides of the fracture; secure this by a wedge placed between the back of the cramp and the felted slip, and then apply the necessary pressure first to the cramp, and then to the wedge, until the fracture has been closed, and both sides are perfectly flush and even. The slip and wedge should be so arranged that progress can be watched; in this case it will be impossible to clean away every trace of glue before it sets, but what little oozes out of the joint after the preliminary wipe over, is absorbed by the paper which is placed between the felted slip of wood and the surface of the varnish.

In all repairs of the foregoing nature the end in view is to accomplish the work in such a manner that the repair will be scarcely discernible; the work must also be done in such a manner that the tone of the instrument is not impaired, and in a bulky instrument like the violoncello it is necessary that the repair shall be executed in a strong manner. Many repairers line fractures with parchment paper; it is true that Stradivari lined the ribs of some of his violoncellos with strips of canvas, but there may have been some reason for this, the wood may have been of a particularly brittle nature, and it is a well-known fact that the Stradivari violoncellos are often quite thin in the ribs. I do not think it is wise to follow the Stradivari plan,

the use of the wooden stud, especially in repairs to the table, is much better; besides offering greater rigidity, it is not so likely to impede vibration.

A simple fracture is generally quite easy to repair; more skill is required, however, when a piece of the original wood is missing. Here we have the problem of inserting a piece of new wood which shall match the original in grain, tint and—if it be the back or ribs—in flame or marking.

Most repairers keep a good stock of odd pieces of maple, sycamore, and pine. These hoards are accumulated during a lifetime from various sources: the sound boards of old pianos, the interior woodwork of old furniture, odd pieces of wood left over from previous repairs, etc., etc. One repairer informed me that on one occasion he took out the whole interior of a piece of Italian furniture, as it happened to be of a period contemporary with Stradivarius, and was constructed of pine similar to that used by the master. A piece of vandalism which some furniture collector would moan over at some future date, but which my friend thought quite justifiable under the circumstances. "Of what value is a piece of old Italian wood inside that bureau, when a piece of common deal will do just as well?"

It is wise, therefore, to save all fragments of pine, and sycamore or maple; they often "come in" in quite a wonderful manner. Having selected a piece of wood of suitable size and thickness for the repair in hand, the problem is to insert it in such a manner that the repair will be difficult to discern.

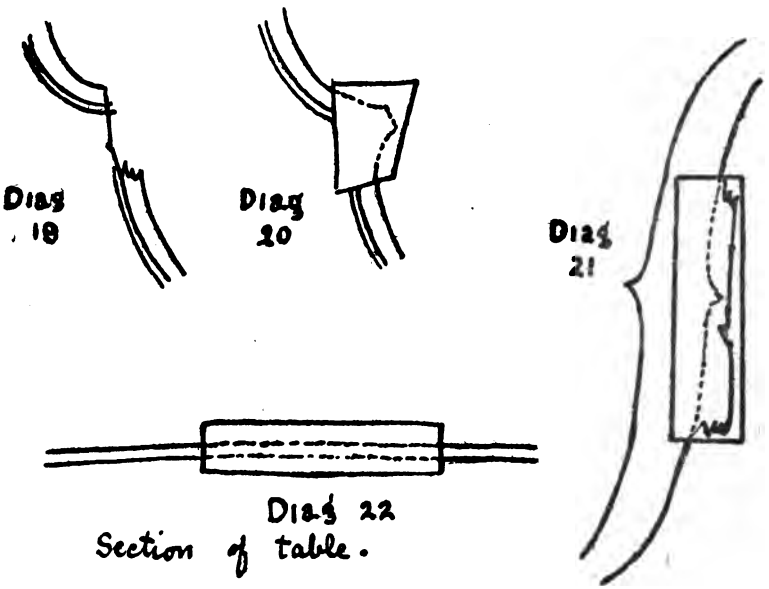
We will imagine that a corner of the table has been knocked off and lost, leaving a jagged rent as diagram

19. A clean cut must be made in such a manner that as little as possible of the original wood is taken away. See that the edges are perfectly true and upright. Now select a piece of old pine from your hoard, matching the reed thread for thread; at present do not attempt any fitting or scooping out, merely fit the threads and make two sides perfectly square so that a perfect joint will result. The piece of wood to be inserted should be left considerably thicker than it will be when finished, and its under side should be perfectly flat. This flat surface and the edges will now be glued, and the piece pressed into position. Nothing more must be done until the glue is quite hard. Experience will tell you whether the piece must be cramped into position, sometimes it is not advisable to use the cramps at all, merely press the piece into position, holding it a moment until the glue grips and suction holds the piece in place.

A glance at diagram 20 will give the state of the work at this stage. The second part of the operation is to make the new corner match its counterpart. A tracing of the opposite corner must now be taken, and the outline carefully drawn on the new wood. The superfluous wood should now be carefully trimmed away, using a sharp knife, a small gouge, or a half-inch joiner's chisel as may be required. Do not get right down to the outline and the modelling straight away; it is so easy to chip away a small splinter more than is required. Leave the finishing to be done with file and glass-paper.

At this stage, the question arises as to the advisability of purfling the new corner. The custom in the trade is to continue the black lines of the purfling with ink,

if the damaged area is of only small dimensions; should it be thought necessary to purfle the corner, the repair takes on a more intricate aspect.



It is often a difficult matter to match the purfling in an old instrument; the outer lines are often brown—not black, and the width of the centre white piece is often much narrower than that in modern purfling. It can be managed in the following manner. Take two strips of purfling a little longer than required, and carefully pare away the outer black strip from

one of the pieces. Now rub down the centre piece of this piece of purfling until it exactly matches the centre of the inlay of the instrument. Against this doctored slip glue the second piece, and put under pressure until the glue is set. You will now have a piece of inlay composed of five strips, three of which match that of the instrument under repair, and two additional strips which must be cut away. It is an intricate piece of work, and in the attempt to bend it to shape it will most likely be damaged. It is as well therefore to prepare several slips in readiness. Another tracing of the corner should be made, indicating the exact shape of the purfling, and the pieces should be bent over a hot iron until they are exact to pattern. The groove is cut, the purfling inserted, some thin glue worked into the channel, and the work again left until the glue sets.

Now comes the difficult problem of tinting down the new wood to match the old, and of applying the varnish. The plan usually adopted is to stain the piece with bi-chromate of potash. I would warn the amateur, however, to be aware of this stain, it has a habit of darkening to a much deeper shade of brown than is required. Repeated tests should be made on odd scraps of wood until the right shade is arrived at; and this fact must be taken into consideration: when applied, the stain is a brilliant yellow, on exposure to diffused light it slowly sinks to a lovely coffee-brown, but as soon as it is exposed to strong sunlight the tint is further lowered until it is almost black. The shade required may not be brown at all; an orange-coloured varnish will sometimes sink into the pine in such a

manner that the shade of the old wood, when a portion is stripped of its varnish, is nearer red than brown. A good plan is to obtain some of the finest dry colours; these can be made into a stain with ammonia, and the tint carefully matched. As it is the fashion to tint the neck of the instrument to match the varnish, it is as well to keep in a few stock solutions, say burnt umber, yellow ochre, venetian red, and, perhaps, gamboge; the latter is rather fugitive, but is often used as it is transparent. The effect of the ammonia is to cause the stain to sink into the wood, the surface can then be sand-papered down until the desired tint is arrived at.

With respect to the varnish used on these small repairs. I may at once say that it is not practicable to use an oil varnish. It is impossible to get the depth of shade required unless several coats of varnish are applied, and the length of time required for the proper drying and finishing of an oil varnish rules it out of the question. I think all repairers use a spirit varnish. If this is well rubbed down, the surface can be brought to that stage of dull polish which most old instruments possess.

The foregoing hints will apply to most repairs to the plates. In some cases, however, it is necessary to remove the table; the back should never be removed except in the most unusual circumstances. A glance at diagrams 21 and 22 will give the method of inserting a piece in the centre of the table; in all such repairs the amateur should not spare any pains in the making of moulds, templates, etc., etc. When pieces have to be fitted into a fractured table it may be necessary to build up a complete mould of the interior of the

table in order that the fractured pieces can be fitted together in perfect line with the surface, or so that pressure can be applied to the spot under repair. A skilful repairer will take four hours making his preparations for the work, and perhaps only half-an-hour over the actual job; the amateur rushes straight at the work, and wonders how it is he cannot obtain the same results. These kind of repairs should be undertaken in the spirit with which the "Portland Vase" was restored; if an instrument is smashed into fifty fragments, it is possible, with loving care and skill, to restore it so that it may once again be a source of joy to some player or collector. Beware of the man who says, "let me fit a new back, or a new table"; in very few cases is the damage so great that a restoration cannot be effected.

An old violoncello is particularly sensitive to the kind of strings with which it is fitted, and it is wise to devote a little time to this matter.

In the olden days, the strings were generally much too thick, especially the covered strings; the tendency in the present day is to go to the other extreme, and I find that many of the G strings are too thin. Many improvements have been made in the manufacture of strings, and although it is an advantage to have the wire as finely spun as possible, it is not policy to use a gut string which is too slight.

It is wise to use a string gauge, and when the correct thickness of string has been ascertained the gauge should be noted; this will simplify the selection of suitable strings when they require renewing.

I am told that Mons. Hollman uses an A string

which is almost as thick as the usual D; but he is a player with a powerful physique, and perhaps his violoncello is strongly built, at any rate we all know what a fine tone he produces. Discussing this matter with my old friend the late Signor Papini, the latter said, "I do not think anyone could follow Mons. Hollman's example unless they had his fingers, one must select one's instrument—and also the strings—according to one's physique." Then followed a long discourse about the wonderful power of the old players, and some interesting particulars about Bottesini, the famous contrabassist with whom Papini had several concert tours.

As a rule, an old Italian violoncello requires strings of only medium thickness, the same applies to any old instrument of slight build; a modern instrument can often take a slightly thicker string, and in fact if a modern instrument is fairly thick in the plates, it will require thick strings to produce the best tone of which the instrument is capable.

Many young players make the mistake of putting on a new set of strings a day or so before a concert. It takes quite a time for a new string to settle down, and for the bow to wear the string sufficiently to get a proper grip. This is more noticeable in the violoncello and bass than it is in the violin. I always make it a practice to change the strings periodically, even if they do not seem to require it. I never change the whole set at one time, but adopt the following plan. First, I renew the A string; then, after a day has elapsed, I put on a new D; when these two strings have been fairly tested as to fifths and purity of tone, I renew the G and C strings. I always keep an extra

A string ready stretched. In case of accident, or if it is found that constant playing has worn the A string somewhat, the stretched A string can be put on just before the concert.

If the foregoing plan is adopted, the instrument is not likely to be disturbed to such a degree, as would be the case if the whole set was renewed at one time. When once the strings are settled in tune, it will be found that they do not vary in pitch with the change of atmosphere, as new strings will do, and this is an advantage, especially to a soloist. Nothing is more disturbing than to find that your C and G strings have sharpened, and the A string flattened as soon as you are comfortably in the middle of the first movement of a concerto.

Although I never use any kind of oil on my strings, I think it is advisable for those who play regularly in the orchestra to take whatever care they can of the strings. Every trace of perspiration should be carefully wiped away after the performance, and a drop of olive oil—or some of the special brand of string oil—carefully rubbed into the string.

The best strings to use are those which are not too highly polished. Several brands are stocked by dealers; Ruffini, Rough Roman, and others sold under various names—if of the rough Italian kind—should be tried. The British Strings, Ltd., make a steel string with a special bridge guard. Players in cinemas and theatres should try this string, the slightly metallic quality of tone—a quality sometimes desired in a small orchestra—is compensated for by the great durability, and I find that harmonics are quite easy to produce.

I think most of the modern inventions have been mentioned. Of patent pegs, the Becker peg had quite a vogue for a number of years; I believe the late August Van Biene used this patent peg; the latest improvement is the "Tuneometer"; this is on the principle of the machine head, but whilst having all the advantages of that invention, it has none of its disadvantages. It is certainly a boon to those who suffer from slipping pegs, and ladies and children find it a great aid to easy and correct tuning.

THE END.

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Printed by J. H. Lavender & Co., 2, Duncan Terrace, London, N. 1.

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